FCC PART 15.247
TEST REPORT

For

QUANZHOU BADU ELECTRONIC TECHNOLOGY CO., LTD

NO.12, EAST ROAD, ANQIAN INDUSTRIAL, ANHAI TOWN, JINJIANG, FUJIAN, China

FCC ID: 2BGS8-BD-881

Report Type:	**Product Name:**
Original Report	ELECTRONIC KEYBOARD

Report Number:	2407T28020E-RF-01
Report Date:	2024-07-10
Reviewed By:	Stein Peng
Approves By:	Miles Chen
Prepared By:	Bay Area Compliance Laboratories Corp. (Xiamen) Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone XiaMen Tel: +86-592-3200111 www.baclcorp.com.cn

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	2407T28020E-RF-01	R1V1	2024-07-10	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:	ELECTRONIC KEYBOARD
Tested Model:	BD-881
Multiple Model(s):	883, 886
Power Supply:	DC 5V from adapter or DC 6V from battery
Maximum Output Power:	GFSK:-3.33 dBm π/4-DQPSK:-2.52 dBm 8DPSK:-1.96 dBm
RF Function:	Classic BT
Operating Band/Frequency:	2402-2480 MHz
Channel Number:	79
Channel Separation:	1 MHz
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type:	PCB on-board
★Maximum Antenna Gain:	0.5dBi
EUT Received Status:	Good

Note:
1. The Maximum Antenna Gain was declared by manufacturer.
2. The model difference please refer to declaration letter.
3. All measurement and test data in this report was gathered from production sample serial number: 2LBU-1 (Assigned by the BACL (Xiamen). The EUT supplied by the applicant was received on 2024-05-14)

Objective

This test report is prepared for *QUANZHOU BADU ELECTRONIC TECHNOLOGY CO., LTD* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine Compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and 558074 D01 15.247 Meas Guidance v05r02.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Xiamen) to collect test data is located on the Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone XiaMen.

Bay Area Compliance Laboratories Corp. (Xiamen) Lab is accredited to ISO/IEC 17025 by A2LA (Certificate Number: 7134.01) and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN1384.

Measurement Uncertainty

Item	Frequency Range	U_{lab}
AC Power Lines Conducted Emissions	150kHz-30MHz	2.33 dB
Radiated emission	9kHz-30MHz	2.59 dB
	30MHz~1GHz	7.49 dB
	1GHz~6GHz	4.6 dB
	6GHz~18GHz	5.42 dB
	18GHz~26.5GHz	5.37 dB
Occupied Bandwidth		±0.10MHz
Transmitter Conducted Power		±0.624 dB
Conducted Spurious Emission		±2.52 dB
Temperature		±1℃
Humidity		±5%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

SYSTEM TEST CONFIGURATION

Test Mode and Voltage

The system was configured for testing in a typical mode (as normally used by a typical user).	
Test mode:	Test Mode 1: Transmitting
Test voltage:	Test Mode 1: DC 5V from the Adapter (120V/60Hz) or DC 6V from battery
Remark:	During all emission tests, the EUT was configured to measure its highest possible emission level and the worst case's test data was presented in this test report.

Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	…	…
…	…	…	…
…	…	78	2480
39	2441	/	/

EUT was tested with Channel 0, 39 and 78.

★EUT Exercise Software

RF Test Tool: FCC_assist_1.0.2.2

Test Modes	Power Level Setting		
	Lowest Channel	Middle Channel	Highest Channel
GFSK	**10**	**10**	**10**
π/4-DQPSK	**10**	**10**	**10**
8DPSK	**10**	**10**	**10**

Note: The power level was declared by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

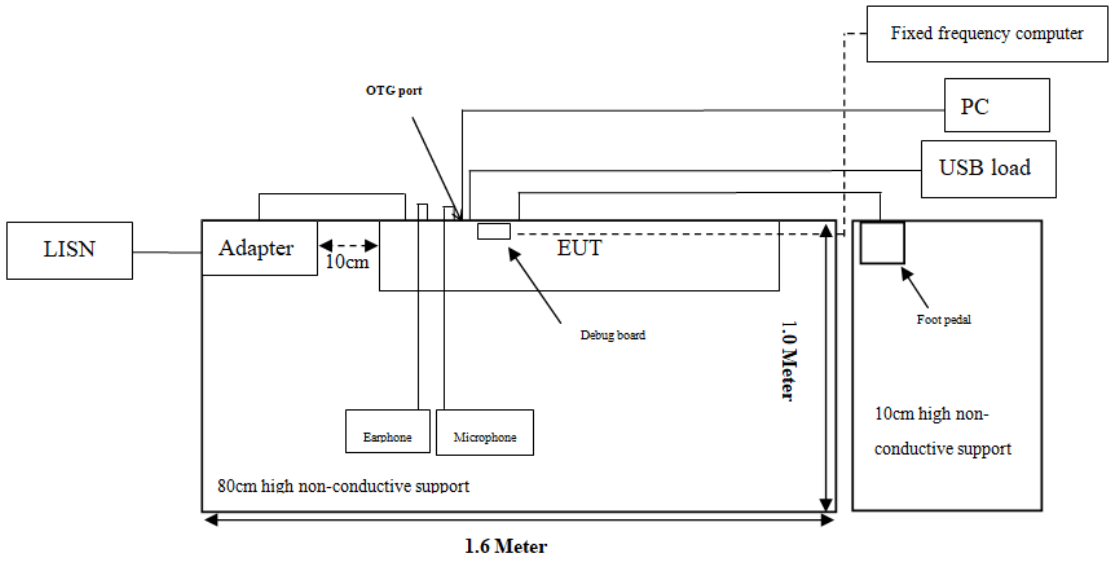
Manufacturer	Description	Model	Serial Number
KLEC	SWITCHING POWER SUPPLY	SW-0983	SW-W9721
Thinkpad	Fixed frequency computer	945K19U	20L6SDKD00
Thinkpad	PC	0SMMSG2	92D9459E
OPPO	Earphone	Reno4	022535448
KINGWAY	Microphone	BKW-X1	215632857
/	USB load	5W10RJ	/

External I/O Cable

Cable Description	Length (m)	From Port	To
USB cable	1.0	AC Source	EUT
USB extension cable	8	Debug board	Fixed frequency computer
USB extension cable	8	USB port	USB load
USB extension cable	8	OTG port	PC
Earphone cable	1.0	EUT	Earphone
Microphone cable	1.0	EUT	Microphone

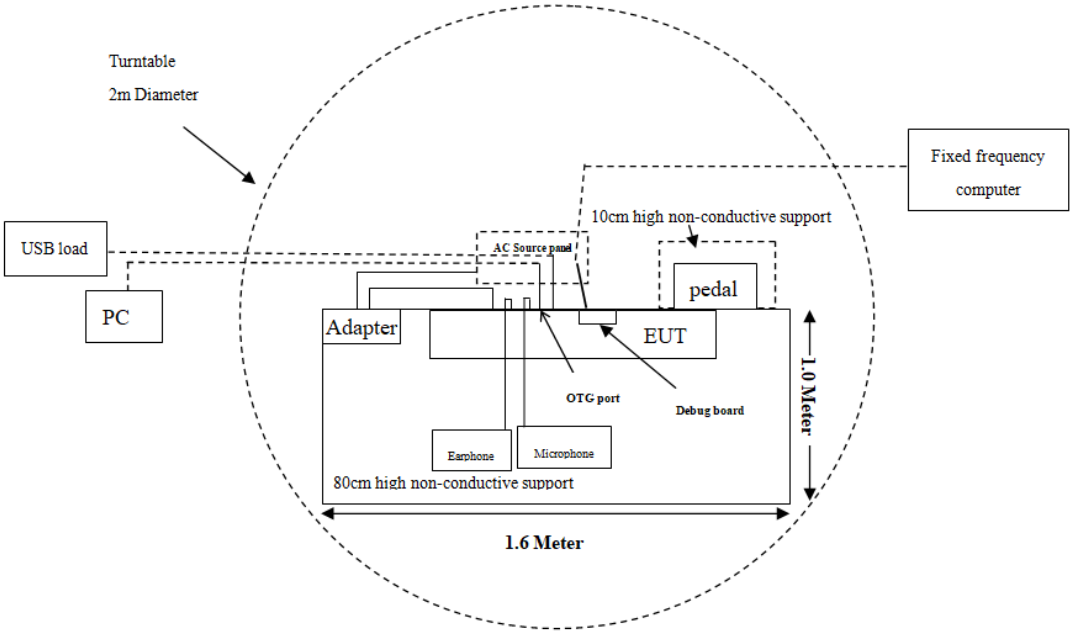
Block Diagram of Test Setup

Conducted Emission:

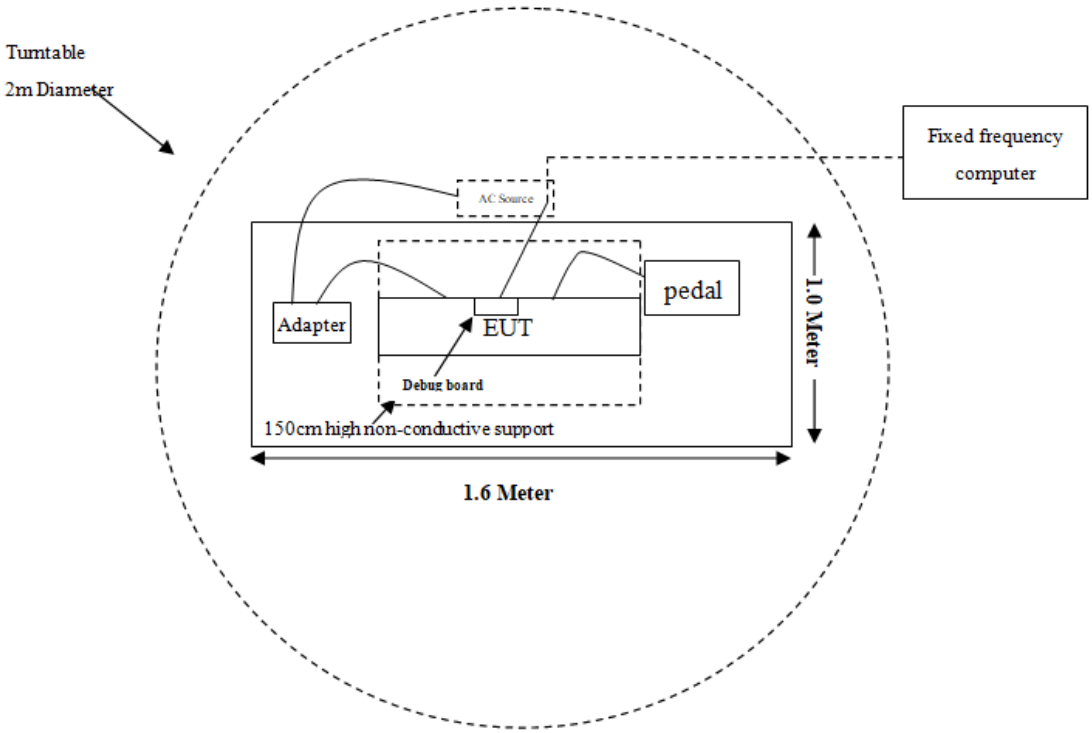


Radiated Emission

Below 1GHz



Above 1GHz



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions & Restricted Bands Emissions	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Test Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
EMI Test Receiver	Rohde & Schwarz	ESR	103105	2023/09/12	2024/09/11
LISN	Rohde & Schwarz	ENV216	100129	2023/09/12	2024/09/11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC001	2023/08/29	2024/08/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESR	103103	2023/09/12	2024/09/11
Loop Antenna	Rohde & Schwarz	HFH2-Z2	830749/001	2023/07/27	2026/07/26
Antenna	Sunol Sciences	JB6	A122022-5	2023/07/27	2026/07/26
Amplifier	Sonoma	310B	120903	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC002	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-2M	CC006	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-12M	CC007	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	HFH2-CC	335.3609	2023/09/20	2024/09/19
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emission Above 1 GHz					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2023/09/12	2024/09/11
Double Ridge Guide Horn Antenna	A.H.Systems	SAS-571	1980	2023/07/28	2026/07/27
Horn Antenna	EMCO	3116	9407-2232	2023/07/31	2026/07/30
Preamplifier	A.H.Systems	PAM-0118P	489	2023/09/12	2024/09/11
Preamplifier	A.H.Systems	PAM-1840	200	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH800A-N-6M	CC004	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-1M	CC005	2023/08/29	2024/08/28
Test Software	Audix	E3	18621a	N/A	N/A
RF Conducted Test					
Spectrum Analyzer	Rohde & Schwarz	FSU	100405	2023/09/12	2024/09/11
Coaxial Cable	N/A	N/A	N/A	Each time	N/A

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Xiamen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one PCB on-board antenna for Bluetooth, which was permanently attached and the antenna gain is 0.5dBi, fulfill the requirement of this section. Please refer to the EUT photos.

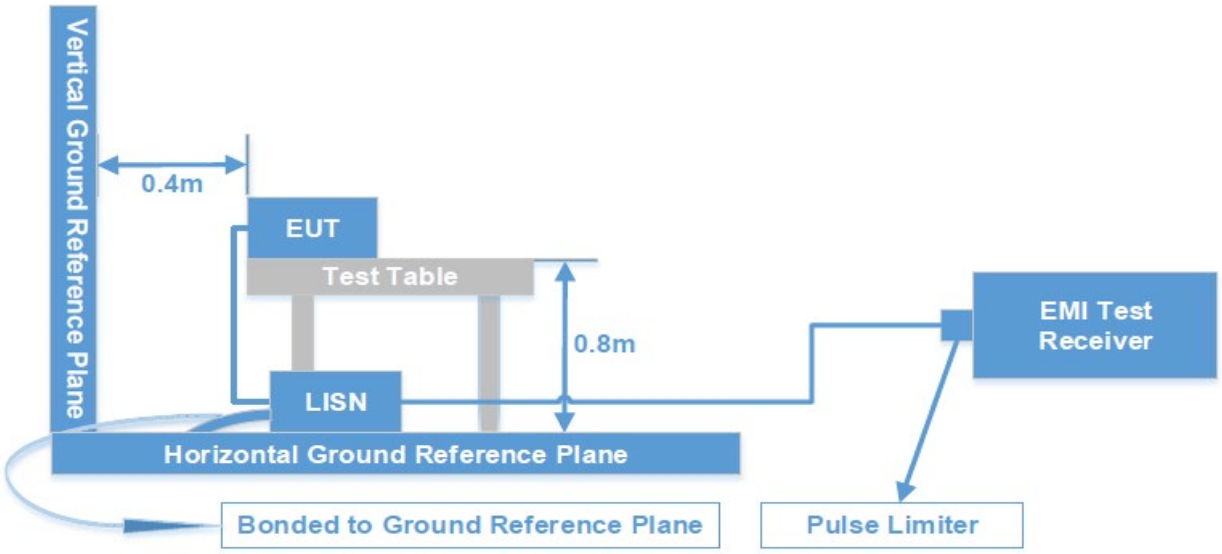
Result: Compliance

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

Test System Setup



The measurement procedure of EUT setup is according with ANSI C63.10-2020. The related limit was specified in FCC Part 15.207.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	VBW	Detector
150 kHz – 30 MHz	9 kHz	30 kHz	QP/AV

Test Procedure

ANSI C63.10-2020 clause 6.2

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

If the maximum peak value of the emissions is below the average limit, the QP value and average value measurement will not need to be performed and only record the maximum peak measured value to meet the requirements.

Level &Margin Calculation

The Level is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
Level (dBμV) = Reading (dBμV) + Factor (dB)

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

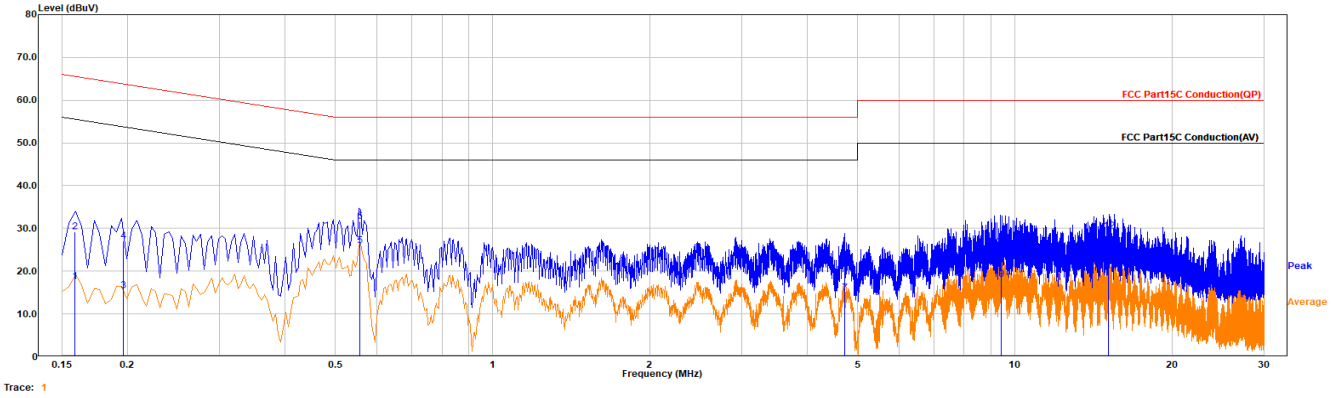
Margin (dB) = Limit (dBμV) – Level (dBμV)

Test Data

EUT operation mode: Transmitting in the low channel of BDR (GFSK) mode (worst case)

Date: 2024-06-18

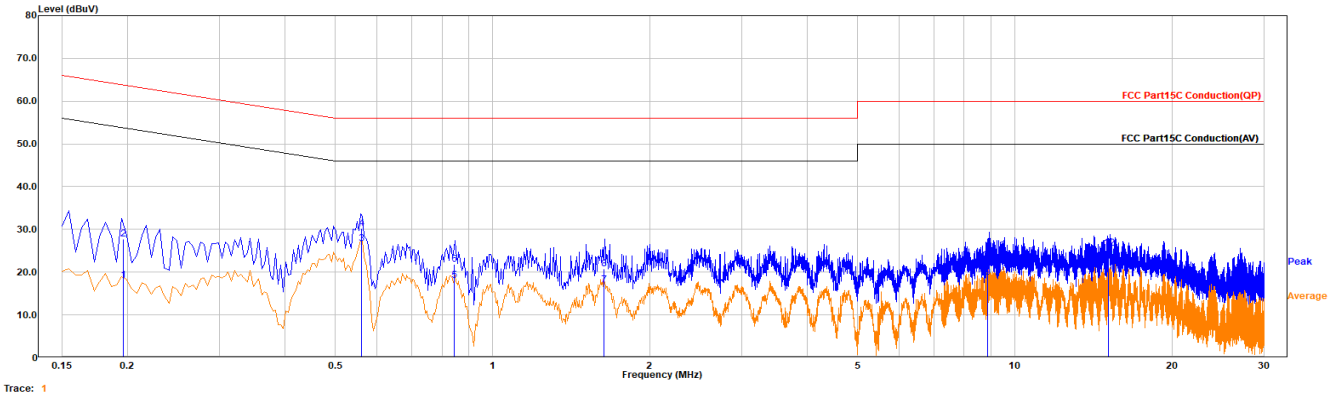
Project No.: 2407T28020E-RF Temp/Humi: 25.9℃/47%
Test Mode: BT BDR CH0 Transmitting Tested by: Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Phase	Remark
MHz	dBuV	dB	dBuV	dBµV	dB		
0.159	-1.98	19.51	17.53	55.53	38.00	Line	Average
0.159	9.64	19.51	29.15	65.53	36.38	Line	QP
0.196	-4.13	19.51	15.39	53.78	38.39	Line	Average
0.196	7.59	19.51	27.10	63.78	36.67	Line	QP
0.556	6.43	19.60	26.02	46.00	19.98	Line	Average
0.556	12.09	19.60	31.69	56.00	24.31	Line	QP
4.723	-4.72	19.60	14.88	46.00	31.12	Line	Average
4.723	2.11	19.60	21.71	56.00	34.29	Line	QP
9.435	-1.82	19.87	18.05	50.00	31.95	Line	Average
9.435	5.90	19.87	25.78	60.00	34.22	Line	QP
15.119	2.75	19.97	22.72	50.00	27.28	Line	Average
15.119	9.43	19.97	29.39	60.00	30.61	Line	QP

Date: 2024-06-18

Project No.: 2407T28020E-RF Temp/Humi : 25.9℃/47%
Test Mode: BT BDR CH0 Transmitting Tested by: Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Phase	Remark
MHz	dBuV	dB	dBuV	dBµV	dB		
0.197	-1.38	19.48	18.10	53.76	35.65	Neutral	Average
0.197	8.22	19.48	27.70	63.76	36.05	Neutral	QP
0.560	7.05	19.60	26.65	46.00	19.35	Neutral	Average
0.560	10.64	19.60	30.24	56.00	25.76	Neutral	QP
0.845	-1.55	19.61	18.06	46.00	27.94	Neutral	Average
0.845	2.14	19.61	21.75	56.00	34.25	Neutral	QP
1.635	-2.69	19.68	16.99	46.00	29.01	Neutral	Average
1.635	1.09	19.68	20.78	56.00	35.22	Neutral	QP
8.883	-0.98	19.83	18.85	50.00	31.15	Neutral	Average
8.883	3.11	19.83	22.95	60.00	37.05	Neutral	QP
15.119	2.76	19.95	22.71	50.00	27.29	Neutral	Average
15.119	5.63	19.95	25.57	60.00	34.43	Neutral	QP

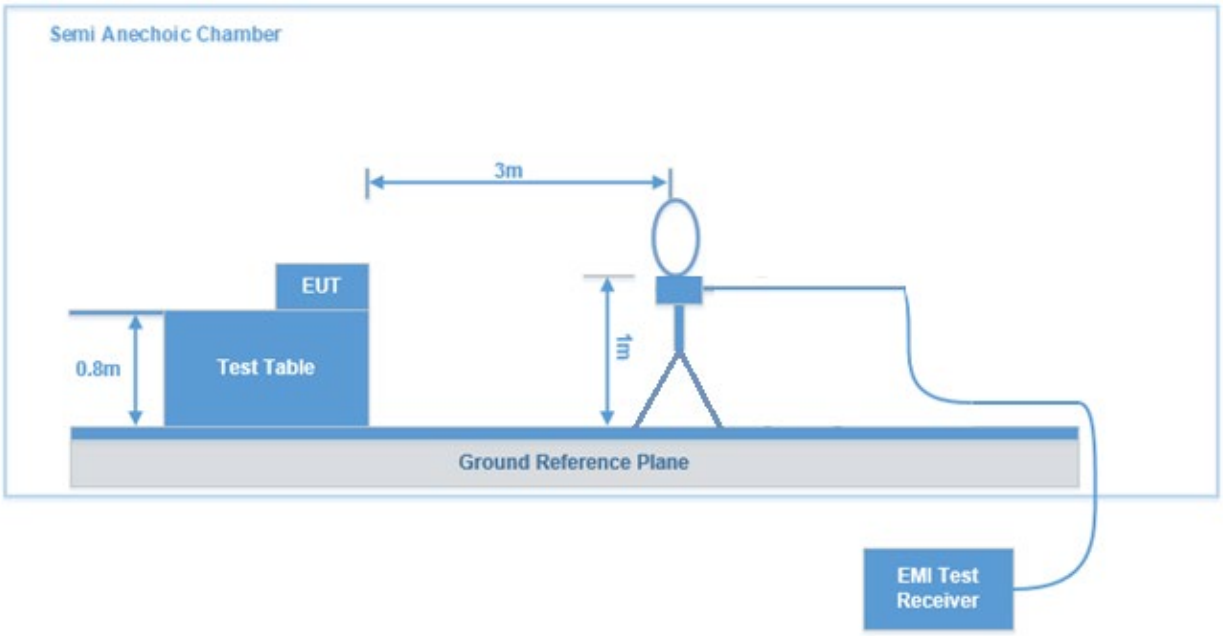
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

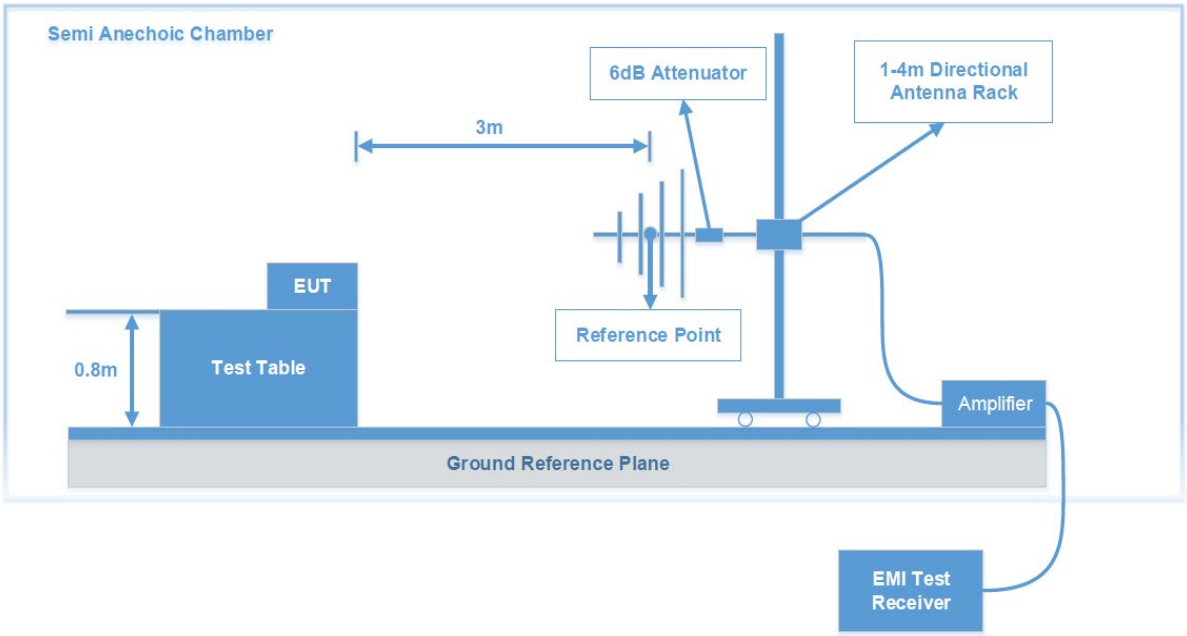
FCC §15.205; §15.209; §15.247(d)

Test System Setup

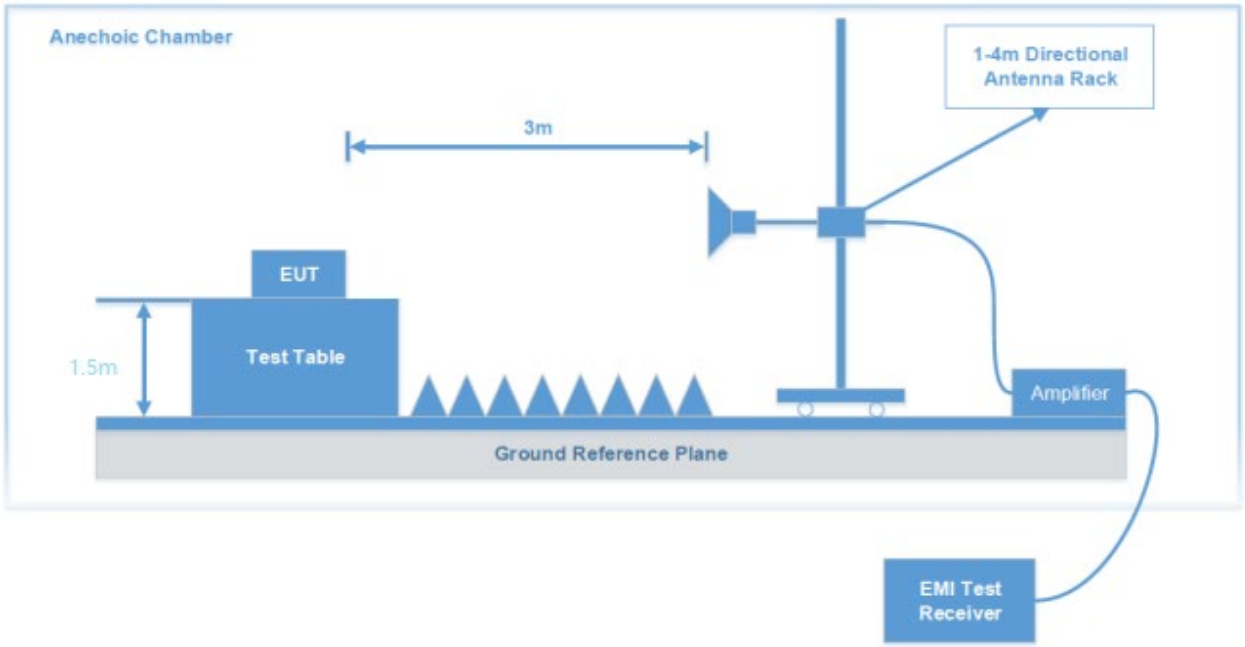
9 kHz-30MHz



Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.209 and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz – 150 kHz	200Hz	1 kHz	/	PK
	/	/	200Hz	QP/AV
150 kHz – 30 MHz	10 kHz	30 kHz	/	PK
	/	/	9kHz	QP/AV
30 MHz – 1000 MHz	100 kHz	300 kHz	/	PK
	/	/	120kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	/	10Hz	AV

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable. The report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground parallel) unless the margin is greater than 20 dB, then the following statement shall be made: "all emissions were greater than 20 dB below the limit."

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at below the AV emission limit, there's no need to record the measured AV level of the emissions in the report.

Level &Margin Calculation

The Level is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)
Level (dBμV/m) = Reading (dBμV) + Factor (dB/m)

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dBμV/m) –Level (dBμV/m)

Test Data

Please refer to the below table and plots.

Frequency Range:	Below 1 GHz	Above 1 GHz	Conducted Spurious Emissions at Antenna Port
Temperature:	22.3℃	20.0℃~23.2℃	23.9℃
Relative Humidity:	60 %	58%~62%	60%
ATM Pressure:	101kPa	100.1 kPa~100.2 kPa	99.8 kPa
Test Date:	2024-06-17	2024-05-29~2024-06-07	2024-05-18
Test Engineer:	Stein Peng	Stein Peng, Toby Chen	Stein Peng

1) 9 kHz ~30MHz

EUT operation mode: Transmitting in low channel of EDR (8DPSK) (worst case)

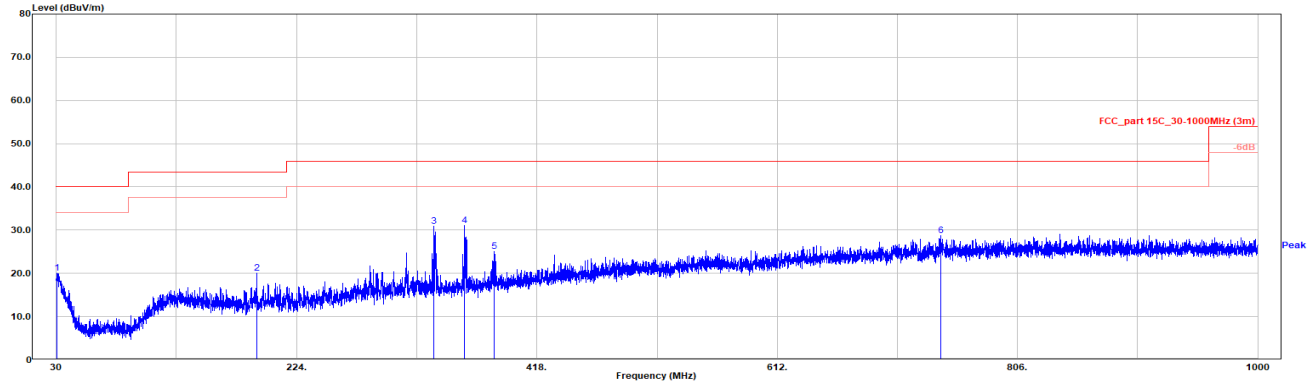
Pre-scan in parallel, ground-parallel and perpendicular of orientation of loop antenna, the amplitude of spurious emissions attenuated is more than 20 dB below the permissible value, which is not required to be report.

2) 30MHz-1GHz

EUT operation mode: Transmitting in low channel of EDR (8DPSK) (worst case)

Date: 2024-06-17

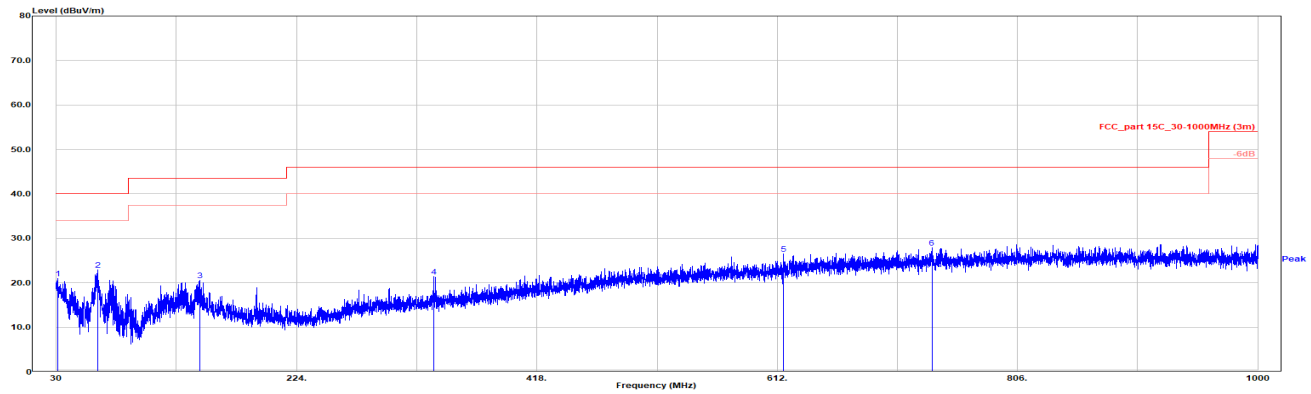
Project No.: 2407T28020E-RF Temp/Humi: 22.3℃/ 60%
Test Mode: Transmitting Tested by : Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
30.485	25.84	-5.72	20.12	40.00	19.88	Horizontal	Peak
191.990	32.28	-12.17	20.11	43.50	23.39	Horizontal	Peak
335.065	39.34	-8.39	30.95	46.00	15.05	Horizontal	Peak
359.509	38.79	-7.77	31.02	46.00	14.98	Horizontal	Peak
383.468	32.03	-6.96	25.08	46.00	20.92	Horizontal	Peak
744.308	28.27	0.42	28.69	46.00	17.31	Horizontal	Peak

Date: 2024-06-17

Project No. : 2407T28020E-RF Temp/Humi : 22.3℃/ 60%
Test Mode : Transmitting Tested by : Stein Peng



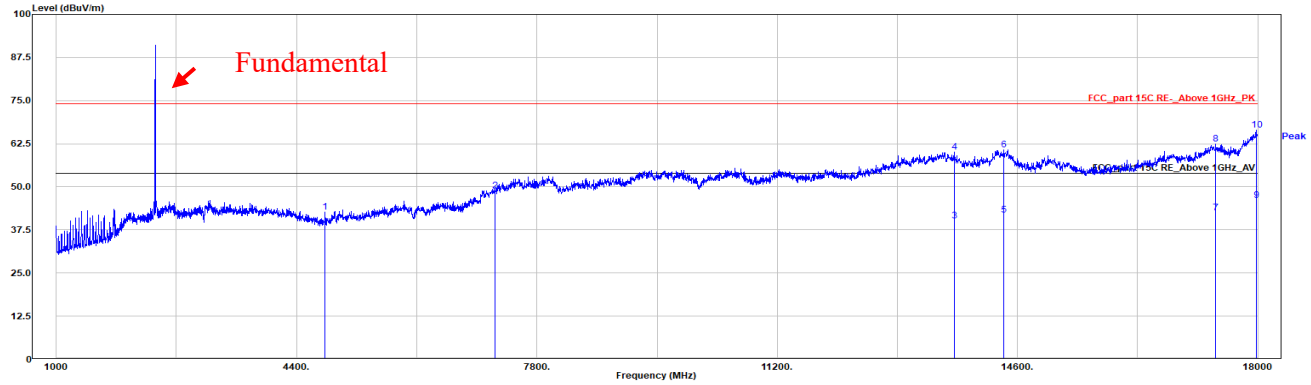
Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
31.261	26.99	-5.99	21.00	40.00	19.00	Vertical	Peak
63.174	40.28	-17.36	22.93	40.00	17.07	Vertical	Peak
145.721	31.48	-10.97	20.52	43.50	22.98	Vertical	Peak
334.580	29.85	-8.41	21.44	46.00	24.56	Vertical	Peak
617.141	28.32	-1.74	26.58	46.00	19.42	Vertical	Peak
736.839	27.56	0.31	27.86	46.00	18.14	Vertical	Peak

3) 1 GHz-18 GHz

EUT operation mode: Transmitting in low channel of EDR (8DPSK)

Date: 2024-05-29

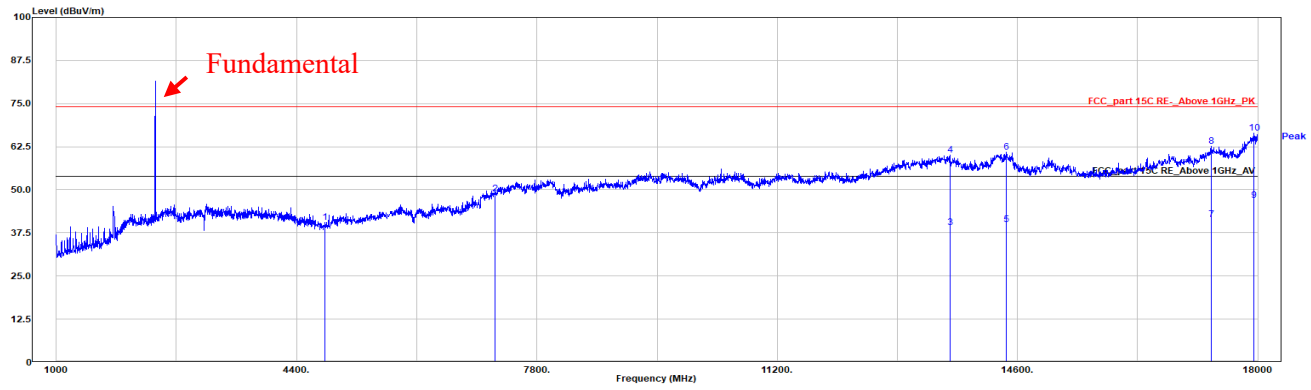
Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4804.600	45.42	-2.73	42.69	74.00	31.31	horizontal	Peak
7206.000	43.81	5.07	48.88	74.00	25.12	horizontal	Peak
13702.400	26.48	13.75	40.23	54.00	13.77	horizontal	Average
13702.400	46.31	13.75	60.06	74.00	13.94	horizontal	Peak
14409.600	27.45	14.27	41.72	54.00	12.28	horizontal	Average
14409.600	46.46	14.27	60.73	74.00	13.27	horizontal	Peak
17401.600	27.45	15.00	42.45	54.00	11.55	horizontal	Average
17401.600	47.52	15.00	62.52	74.00	11.48	horizontal	Peak
17976.200	27.54	18.63	46.17	54.00	7.83	horizontal	Average
17976.200	47.90	18.63	66.53	74.00	7.47	horizontal	Peak

Date: 2024-05-29

Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng

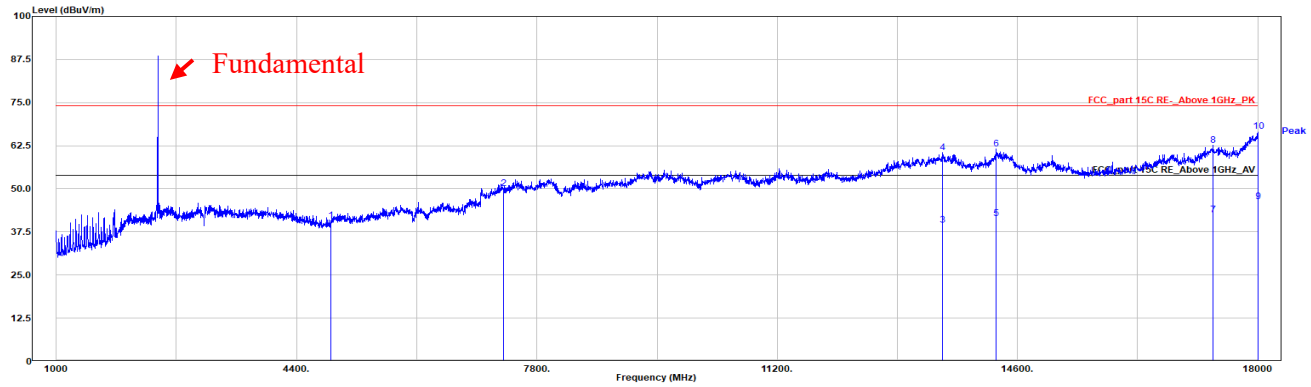


Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4804.600	43.23	-2.73	40.50	74.00	33.50	vertical	Peak
7206.000	43.72	5.07	48.79	74.00	25.21	vertical	Peak
13641.200	24.77	14.28	39.05	54.00	14.95	vertical	Average
13641.200	45.74	14.28	60.02	74.00	13.98	vertical	Peak
14436.800	25.76	14.25	40.01	54.00	13.99	vertical	Average
14436.800	46.67	14.25	60.92	74.00	13.08	vertical	Peak
17337.000	26.48	14.84	41.32	54.00	12.68	vertical	Average
17337.000	47.83	14.84	62.67	74.00	11.33	vertical	Peak
17938.800	28.55	18.41	46.96	54.00	7.04	vertical	Average
17938.800	47.94	18.41	66.35	74.00	7.65	vertical	Peak

EUT operation mode: Transmitting in Middle channel of EDR (8DPSK)

Date: 2024-05-29

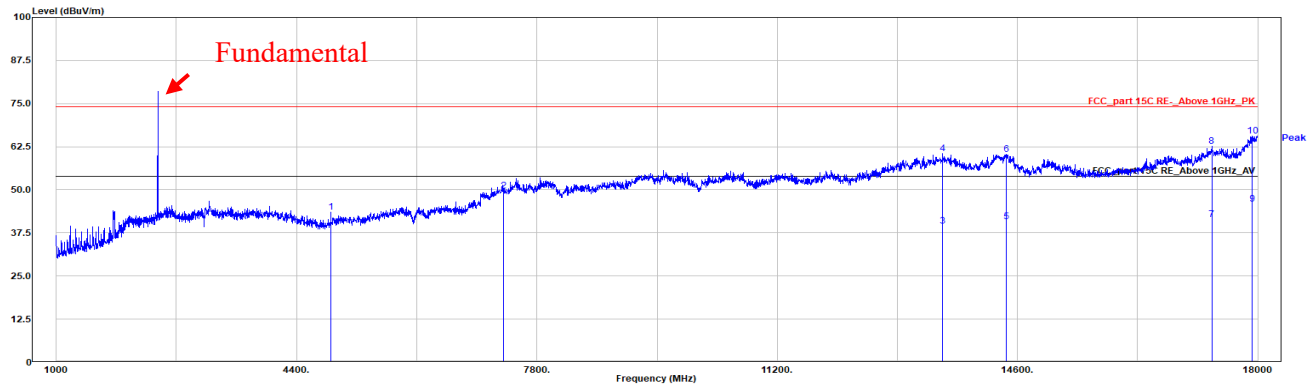
Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4882.000	42.56	-1.75	40.81	74.00	33.19	horizontal	Peak
7324.000	44.56	5.59	50.15	74.00	23.85	horizontal	Peak
13542.600	24.55	14.91	39.46	54.00	14.54	horizontal	Average
13542.600	45.64	14.91	60.55	74.00	13.45	horizontal	Peak
14300.800	26.45	14.85	41.30	54.00	12.70	horizontal	Average
14300.800	46.73	14.85	61.58	74.00	12.42	horizontal	Peak
17371.000	27.55	14.92	42.47	54.00	11.53	horizontal	Average
17371.000	47.79	14.92	62.71	74.00	11.29	horizontal	Peak
18000.000	27.43	18.77	46.20	54.00	7.80	horizontal	Average
18000.000	47.91	18.77	66.68	74.00	7.32	horizontal	Peak

Date: 2024-05-29

Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng

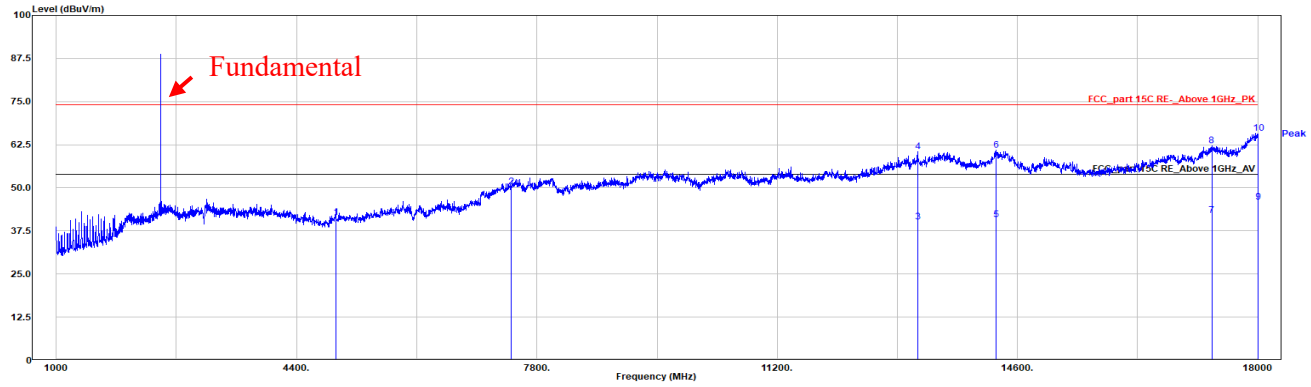


Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4882.800	45.28	-1.73	43.55	74.00	30.45	vertical	Peak
7323.000	44.14	5.60	49.74	74.00	24.26	vertical	Peak
13535.800	24.55	14.94	39.49	54.00	14.51	vertical	Average
13535.800	45.59	14.94	60.53	74.00	13.47	vertical	Peak
14440.200	26.46	14.25	40.71	54.00	13.29	vertical	Average
14440.200	46.09	14.25	60.34	74.00	13.66	vertical	Peak
17347.200	26.45	14.87	41.32	54.00	12.68	vertical	Average
17347.200	47.71	14.87	62.58	74.00	11.42	vertical	Peak
17921.800	27.46	18.31	45.77	54.00	8.23	vertical	Average
17921.800	47.30	18.31	65.61	74.00	8.39	vertical	Peak

EUT operation mode: Transmitting in High channel of EDR(8DPSK)

Date: 2024-05-29

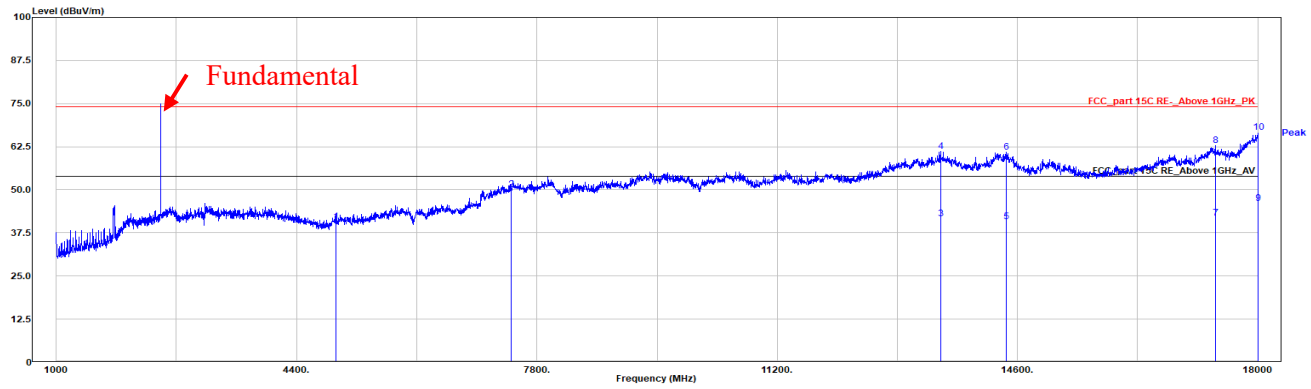
Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4961.000	42.48	-0.98	41.50	74.00	32.50	horizontal	Peak
7440.000	43.86	6.55	50.41	74.00	23.59	horizontal	Peak
13185.600	25.46	14.60	40.06	54.00	13.94	horizontal	Average
13185.600	45.98	14.60	60.58	74.00	13.42	horizontal	Peak
14300.800	25.99	14.85	40.84	54.00	13.16	horizontal	Average
14300.800	46.12	14.85	60.97	74.00	13.03	horizontal	Peak
17347.200	27.12	14.87	41.99	54.00	12.01	horizontal	Average
17347.200	47.40	14.87	62.27	74.00	11.73	horizontal	Peak
18000.000	27.00	18.77	45.77	54.00	8.23	horizontal	Average
18000.000	47.02	18.77	65.79	74.00	8.21	horizontal	Peak

Date: 2024-05-29

Project No. : 2407T28020E-RF Temp/Humi : 20℃/62%
Test Mode : Transmitting Tested by : Stein Peng

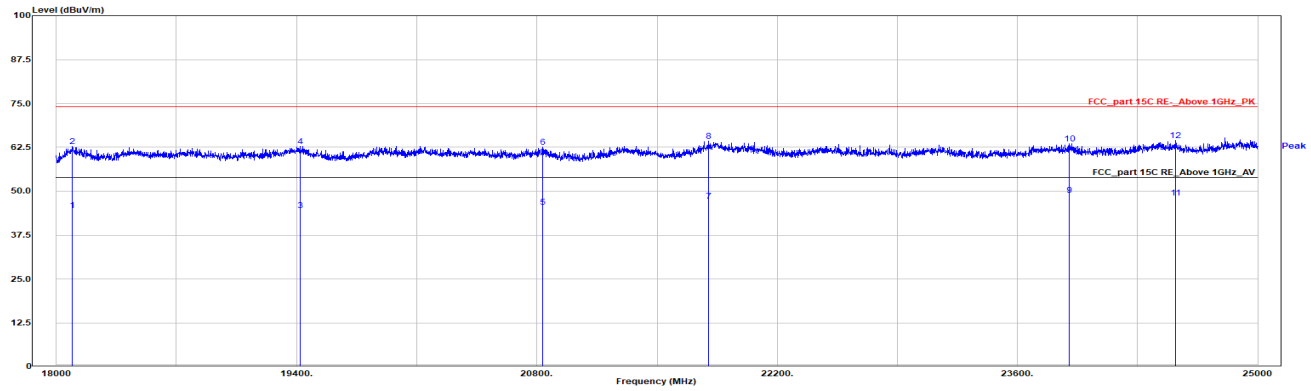


Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
4961.000	41.75	-0.98	40.77	74.00	33.23	vertical	Peak
7440.000	43.53	6.55	50.08	74.00	23.92	vertical	Peak
13508.600	26.46	15.07	41.53	54.00	12.47	vertical	Average
13508.600	46.01	15.07	61.08	74.00	12.92	vertical	Peak
14443.600	26.45	14.25	40.70	54.00	13.30	vertical	Average
14443.600	46.58	14.25	60.83	74.00	13.17	vertical	Peak
17398.200	26.73	14.99	41.72	54.00	12.28	vertical	Average
17398.200	47.95	14.99	62.94	74.00	11.06	vertical	Peak
18000.000	27.24	18.77	46.01	54.00	7.99	vertical	Average
18000.000	47.85	18.77	66.62	74.00	7.38	vertical	Peak

4) 18 GHz~25 GHz (Worst Case)

Date: 2024-06-07

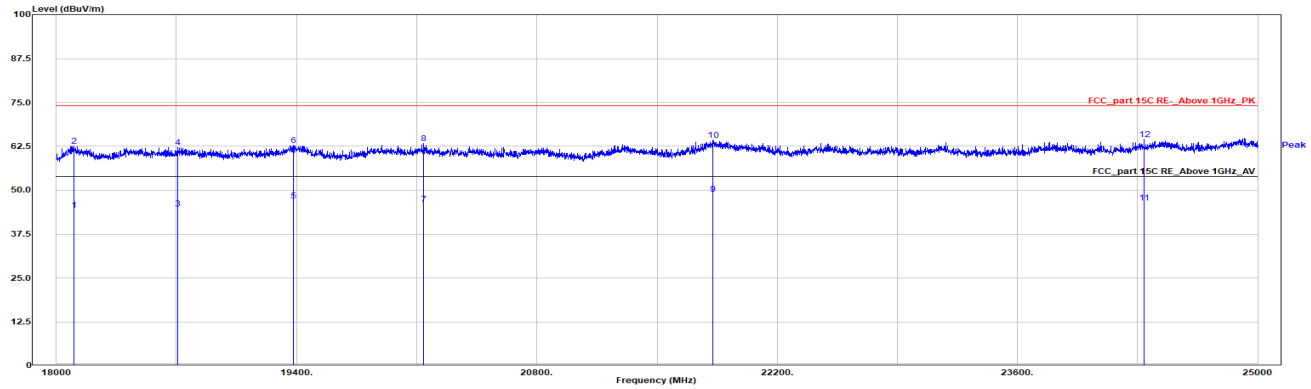
Project No. : 2407T28020E-RF Temp/Humi : 23.2℃/58%
Test Mode : EDR 3DH1 Transmitting Tested by: Toby Chen



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
18095.2	20.74	24.11	44.85	54	9.15	horizontal	Average
18095.2	35.36	24.11	59.47	74	14.53	horizontal	Peak
19422.4	18.33	24.44	42.77	54	11.23	horizontal	Average
19422.4	35.00	24.44	59.44	74	14.56	horizontal	Peak
20835	19.79	24.58	44.37	54	9.63	horizontal	Average
20835	36.86	24.58	61.44	74	12.56	horizontal	Peak
21801	21.00	24.89	45.89	54	8.11	horizontal	Average
21801	37.73	24.89	62.62	74	11.38	horizontal	Peak
23899.6	21.11	25.90	47.01	54	6.99	horizontal	Average
23899.6	35.55	25.90	61.45	74	12.55	horizontal	Peak
24518.4	19.06	28.26	47.32	54	6.68	horizontal	Average
24518.4	35.13	28.26	63.39	74	10.61	horizontal	Peak

Date: 2024-06-07

Project No. : 2407T28020E-RF Temp/Humi : 23.2°C/58%
Test Mode : EDR 3DH1 Transmitting Tested by : Toby Chen

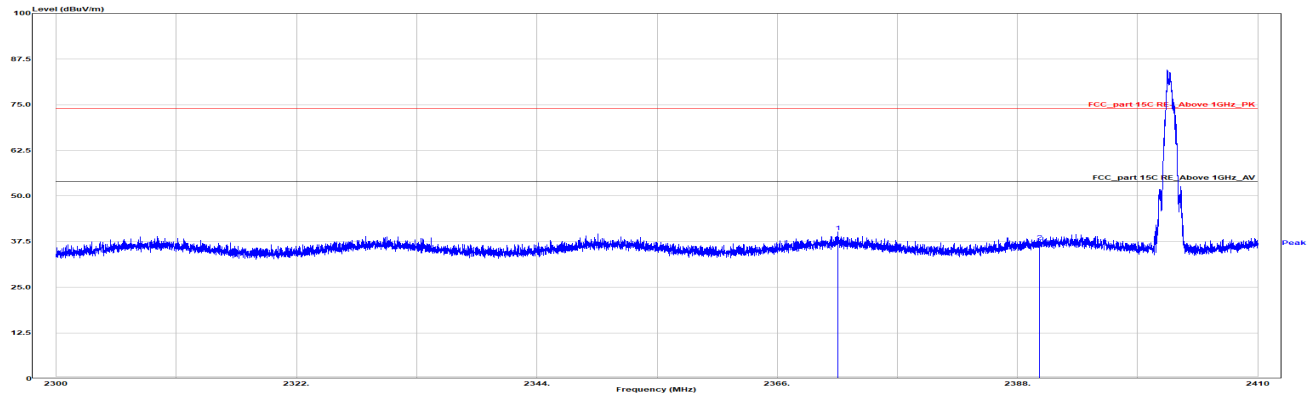


Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
18103.6	20.44	24.11	44.55	54	9.45	vertical	Average
18103.6	38.01	24.11	62.12	74	11.88	vertical	Peak
18708.4	20.31	24.44	44.75	54	9.25	vertical	Average
18708.4	37.57	24.44	62.01	74	11.99	vertical	Peak
19380.4	22.26	24.58	46.84	54	7.16	vertical	Average
19380.4	37.71	24.58	62.29	74	11.71	vertical	Peak
20142	21.14	24.89	46.03	54	7.97	vertical	Average
20142	38.20	24.89	63.09	74	10.91	vertical	Peak
21826.2	22.83	25.90	48.73	54	5.27	vertical	Average
21826.2	38.62	25.90	64.52	74	9.48	vertical	Peak
24336.4	18.02	28.26	46.28	54	7.72	vertical	Average
24336.4	36.06	28.26	64.32	74	9.68	vertical	Peak

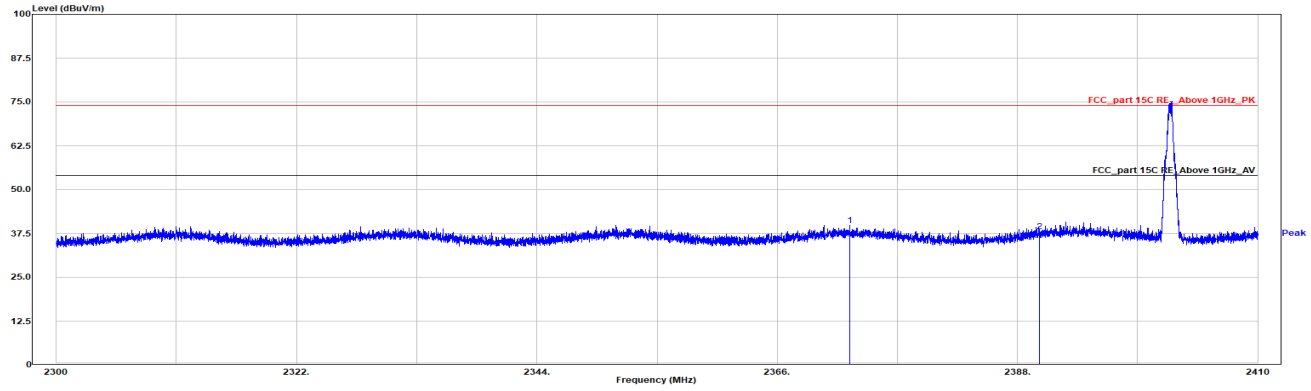
Restricted Bands Emissions:

*Pre-Scan with GFSK, π/4-DQPSK, 8DPSK modes, the worst case **GFSK Mode** is recorded.*

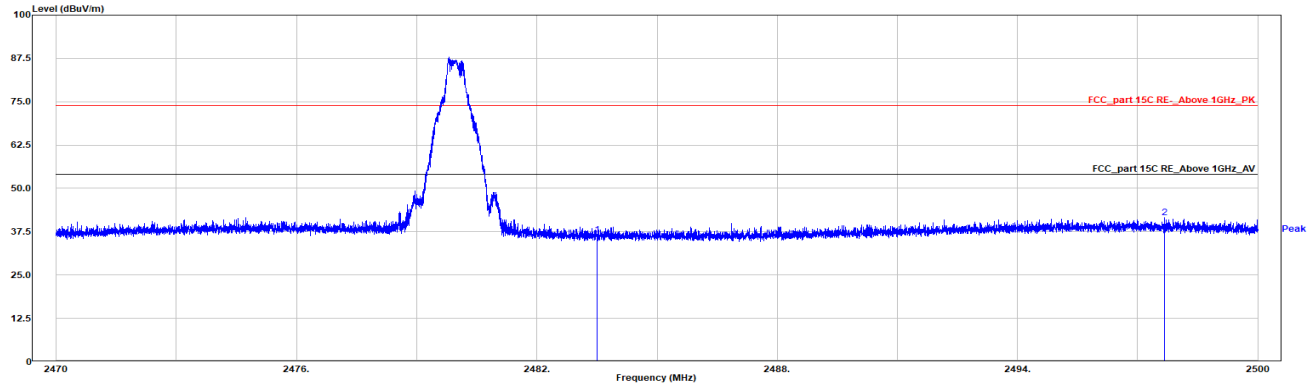
Note:
Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)
Level (dBμV/m) = Reading (dBμV) + Factor (dB/m)
Margin (dB) = Limit (dBμV/m) –Level (dBμV/m)



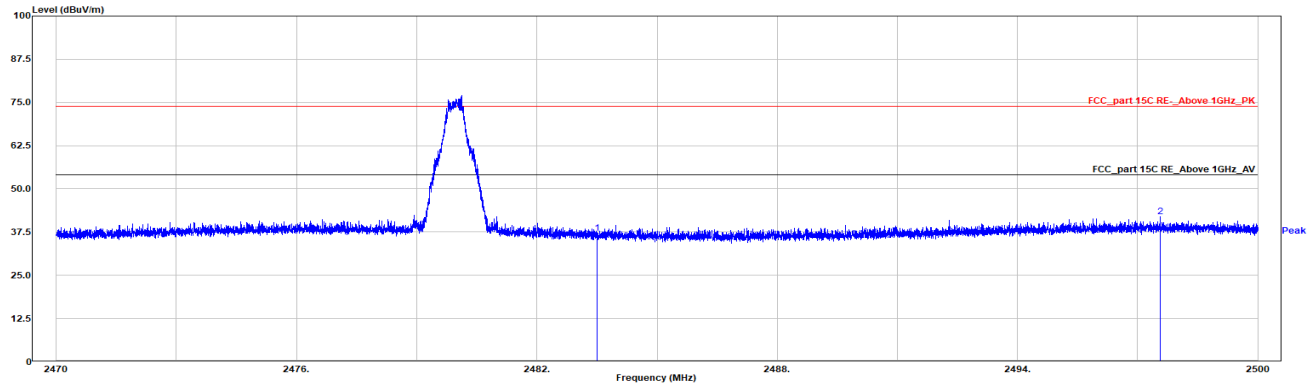
Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
2371.577	36.73	3.48	40.21	74.00	33.79	horizontal	Peak
2390.000	33.97	3.71	37.68	74.00	36.32	horizontal	Peak



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
2372.655	36.38	3.50	39.88	74.00	34.12	vertical	Peak
2390.002	34.35	3.71	38.06	74.00	35.94	vertical	Peak



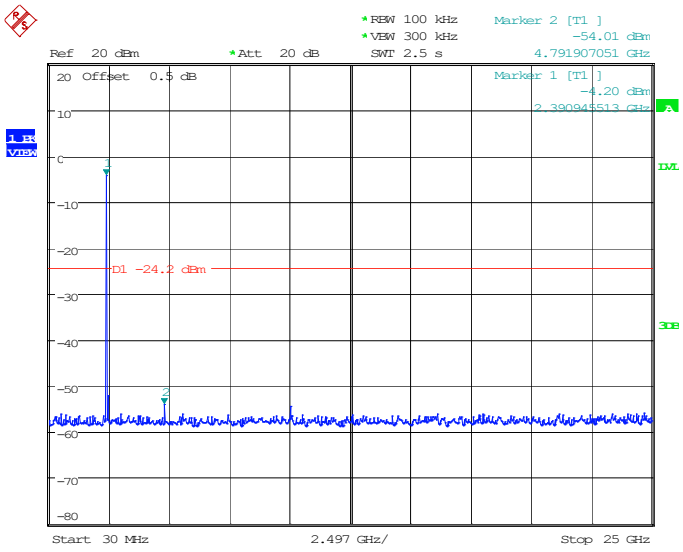
Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
2483.500	32.19	4.43	36.62	74.00	37.38	horizontal	Peak
2497.672	36.84	4.69	41.53	74.00	32.47	horizontal	Peak



Freq	Reading	Factor	Level	Limit	Margin	Pol	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
2483.500	32.72	4.43	37.15	74.00	36.85	vertical	Peak
2497.558	37.19	4.69	41.88	74.00	32.12	vertical	Peak

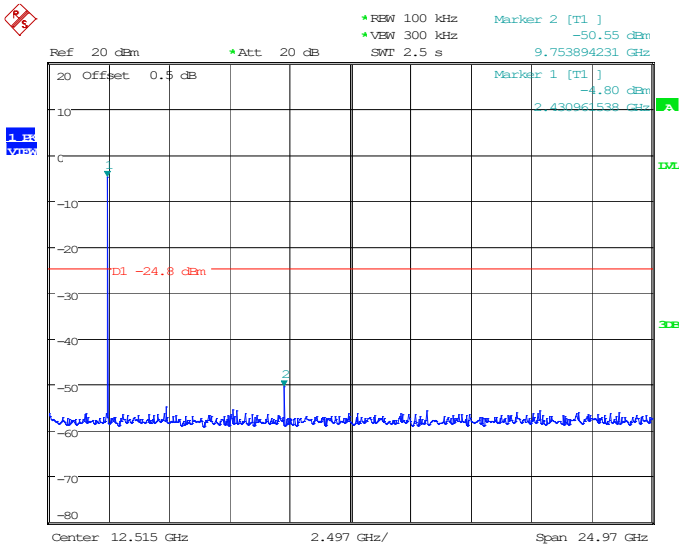
Conducted Spurious Emissions at Antenna Port

BDR (GFSK): Low Channel



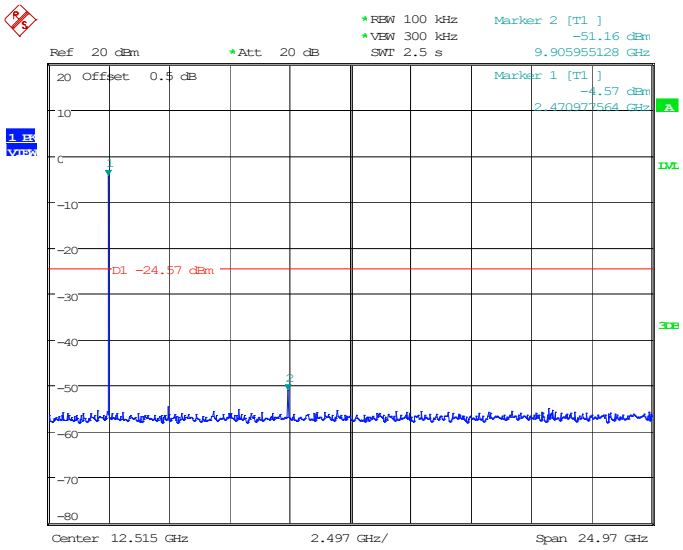
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:14:26

BDR (GFSK): Middle Channel



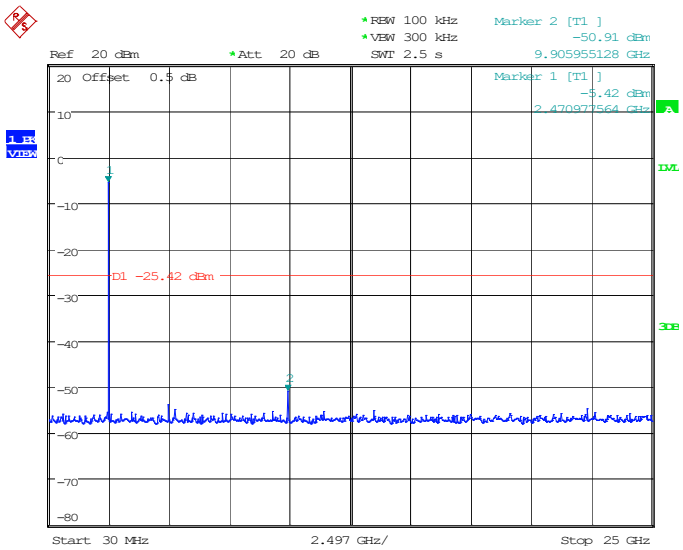
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:12:03

BDR (GFSK): High Channel



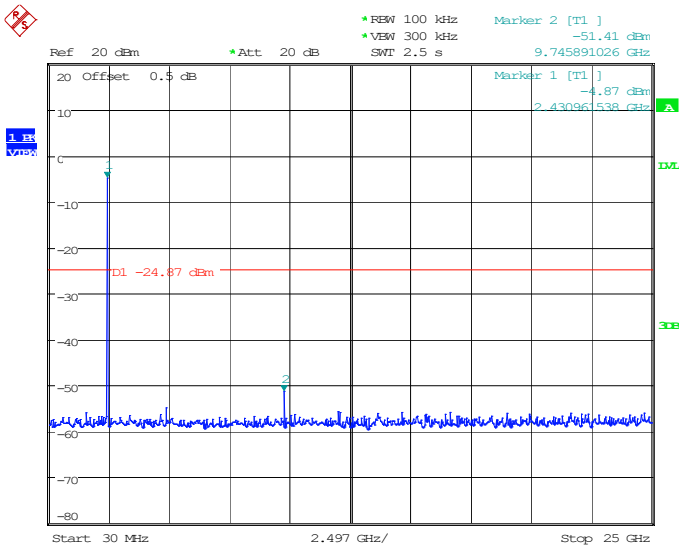
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:16:08

EDR (π/4-DQPSK): Low Channel



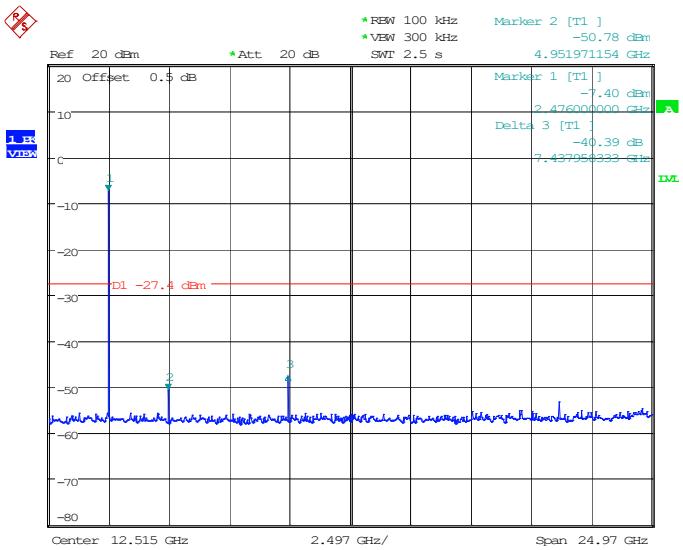
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:20:20

EDR (π/4-DQPSK): Middle Channel



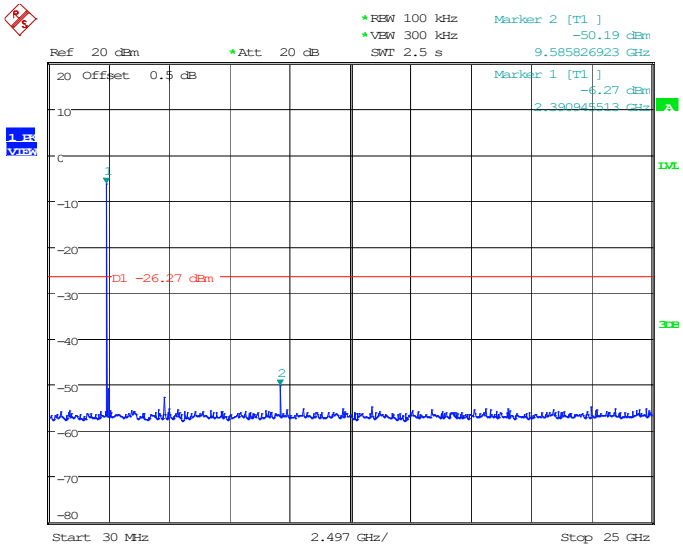
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:18:31

EDR (π/4-DQPSK): High Channel



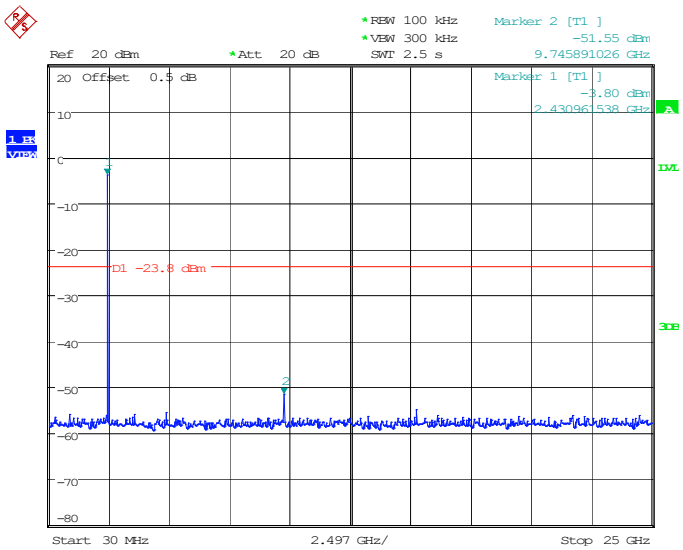
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 27.MAY.2024 10:53:45

EDR (8DPSK): Low Channel



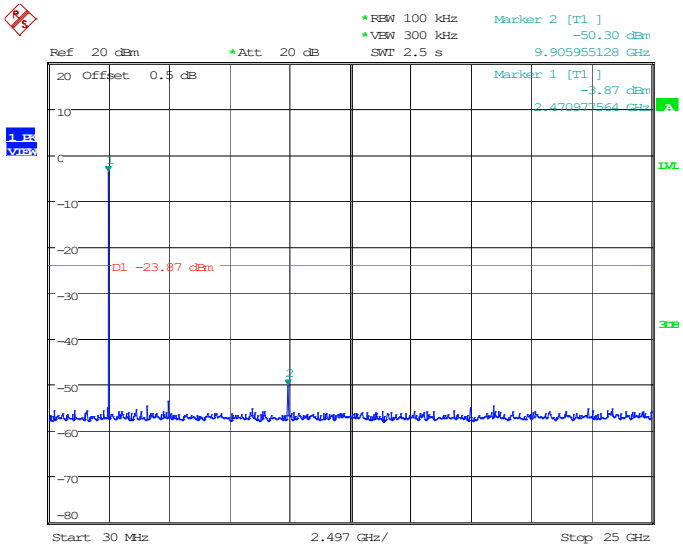
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:22:41

EDR (8DPSK): Middle Channel



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:23:42

EDR (8DPSK): High Channel



Project No. :2407T28020E-RF Tester: Stein Peng

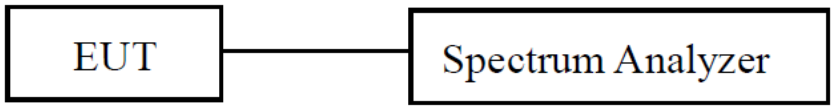
Date: 18.MAY.2024 15:25:21

FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

EUT Setup



Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a. Span: Wide enough to capture the peaks of two adjacent channels.
b. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c. Video (or average) bandwidth (VBW) ≥ RBW.
d. Sweep: Auto.
e. Detector function: Peak.
f. Trace: Max hold.
g. Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

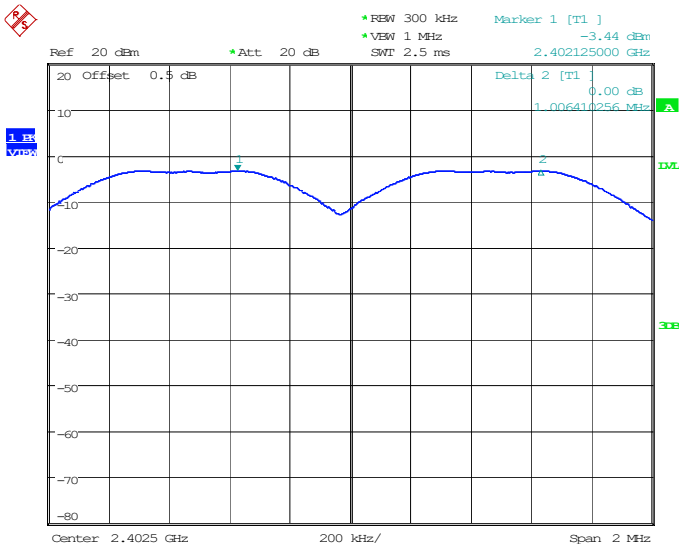
Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9°C Humi.: 60% Atm:99.8kPa

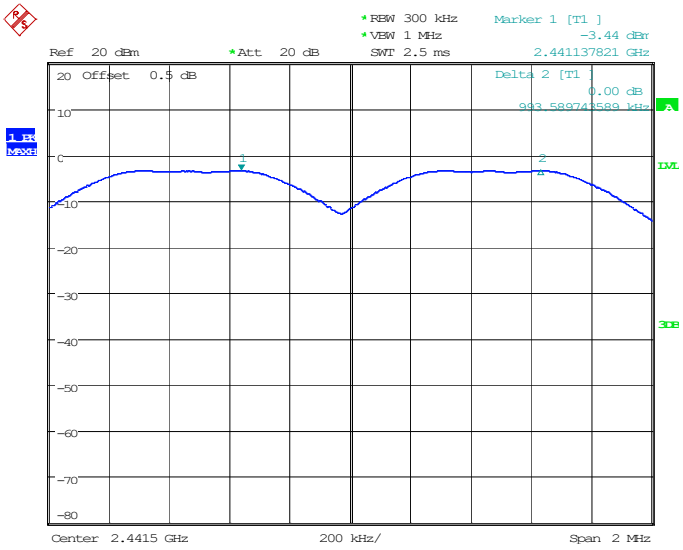
Mode	Channel	Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
BDR (GFSK)	Low	2402	1006.41	585.000	Pass
	Middle	2441	993.59	595.513	Pass
	High	2480	1020.512	595.513	Pass
EDR (π/4-DQPSK)	Low	2402	987.179	841.667	Pass
	Middle	2441	1001.923	839.743	Pass
	High	2480	1014.744	845.513	Pass
EDR (8DPSK)	Low	2402	995.513	825.641	Pass
	Middle	2441	993.59	839.743	Pass
	High	2480	1012.82	829.487	Pass

Note: Limit = 20 dB bandwidth*2/3

BDR (GFSK): Low Channel



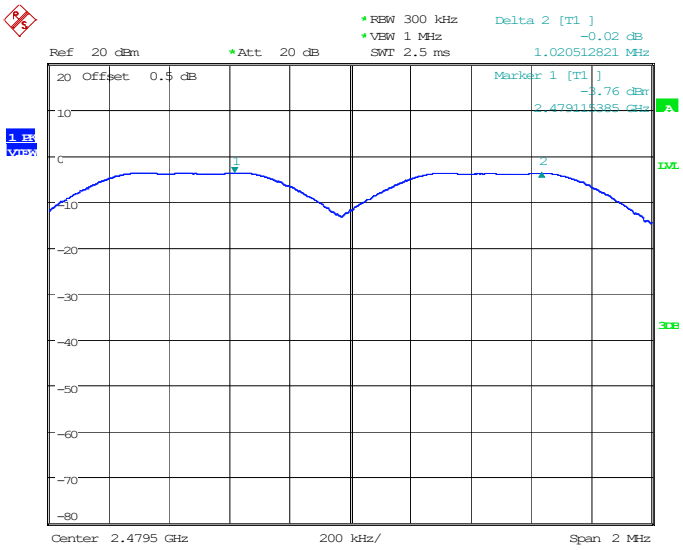
BDR (GFSK): Middle Channel



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 10:32:55

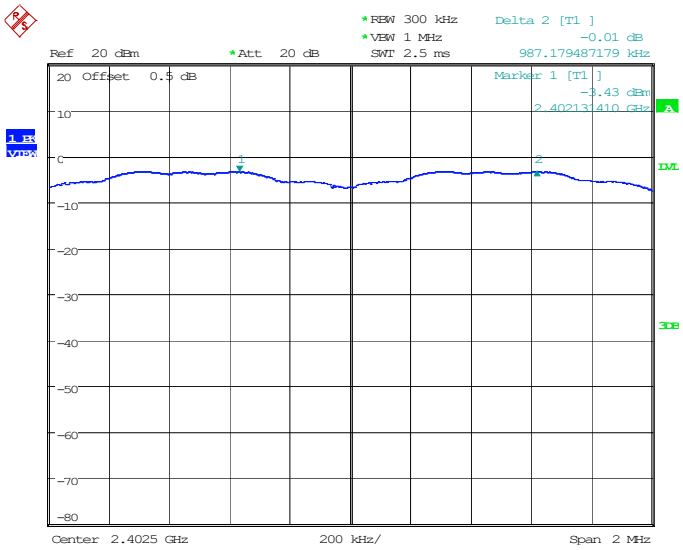
BDR (GFSK): High Channel



Project No. :2407T28020E-RF Tester: Stein Peng

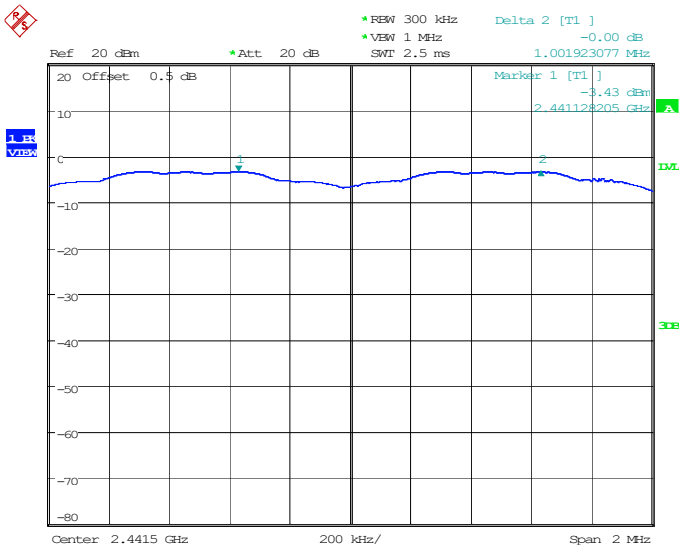
Date: 18.MAY.2024 10:35:58

EDR (π/4-DQPSK): Low Channel



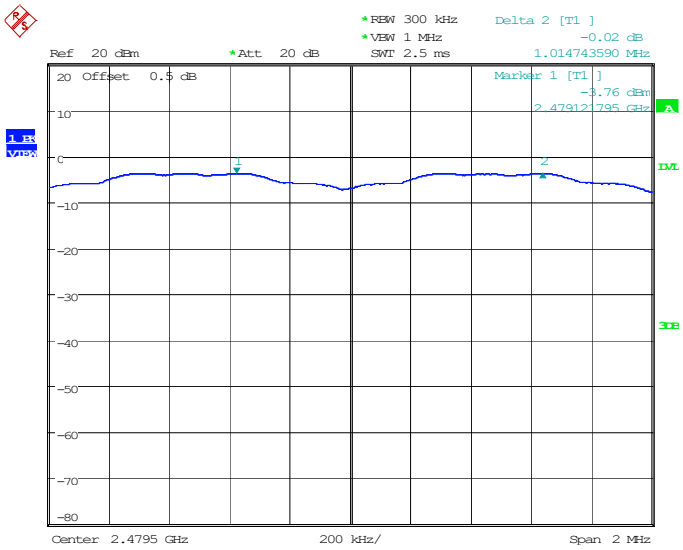
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:19:02

EDR (π/4-DQPSK): Middle Channel



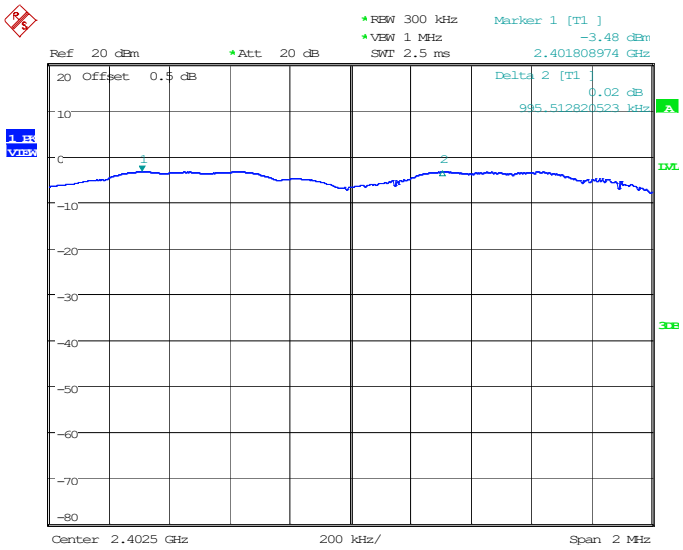
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:31:21

EDR (π/4-DQPSK): High Channel



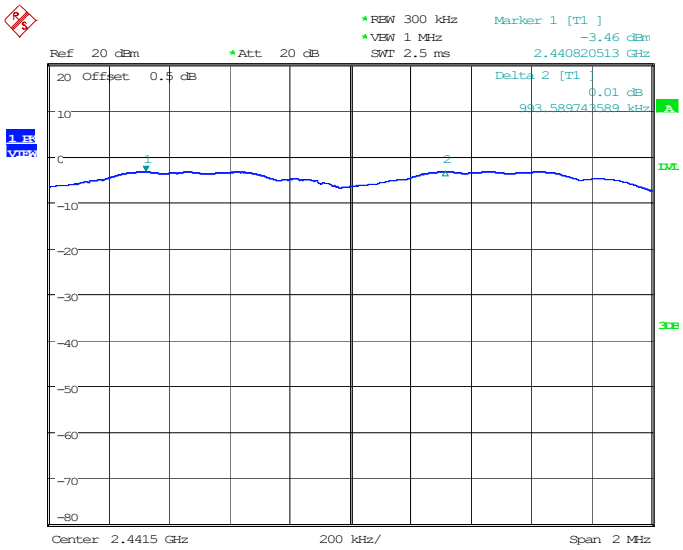
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:38:14

EDR (8DPSK): Low Channel



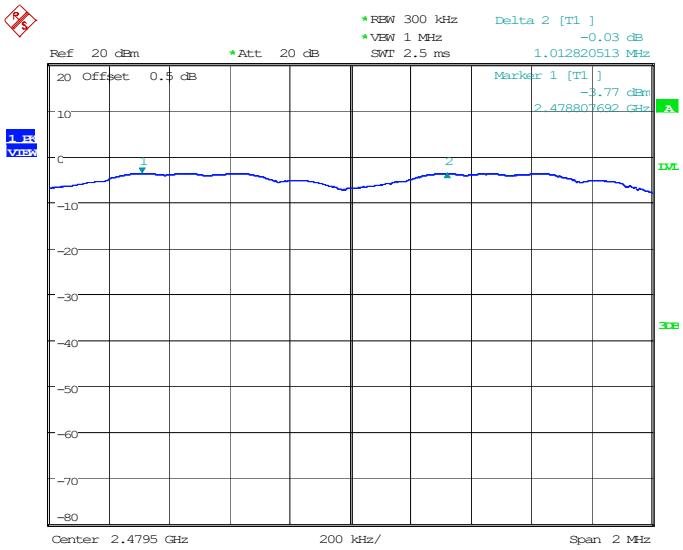
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:24:36

EDR (8DPSK): Middle Channel



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:28:05

EDR (8DPSK): High Channel



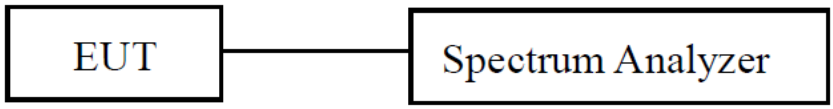
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:40:17

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

EUT Setup



Test Procedure

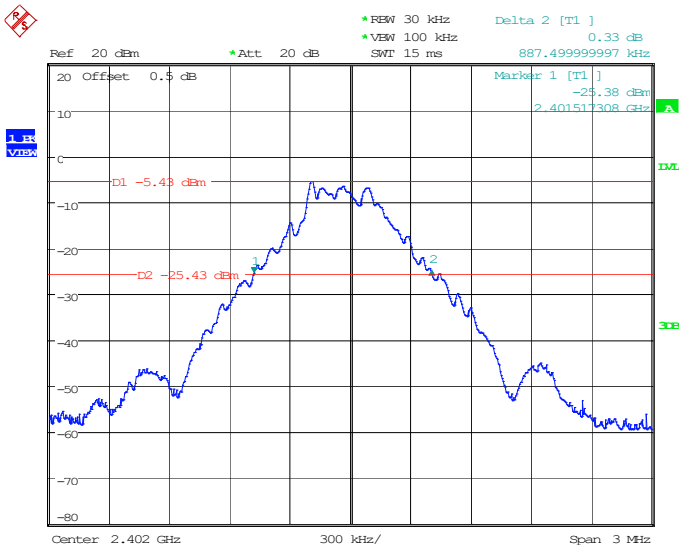
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9℃ Humi.: 60% Atm:99.8kPa

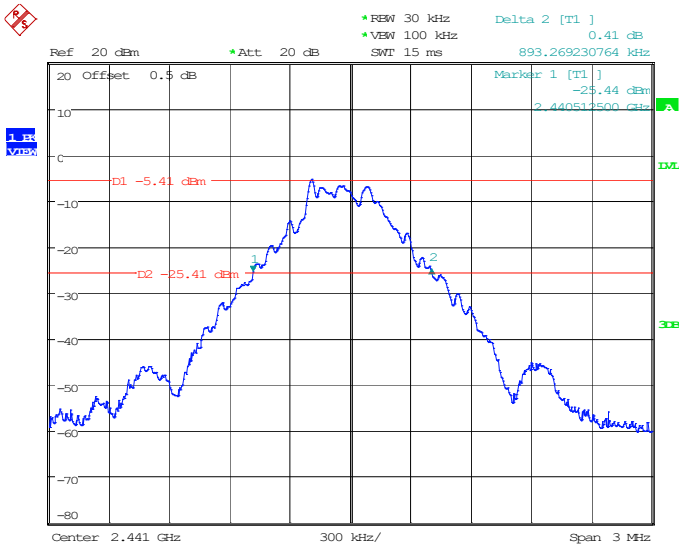
Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
BDR (GFSK)	Low	2402	877.5
	Middle	2441	893.269
	High	2480	893.269
EDR (π/4-DQPSK)	Low	2402	1262.5
	Middle	2441	1259.615
	High	2480	1268.269
EDR (8DPSK)	Low	2402	1238.462
	Middle	2441	1259.615
	High	2480	1244.231

BDR (GFSK): Low Channel



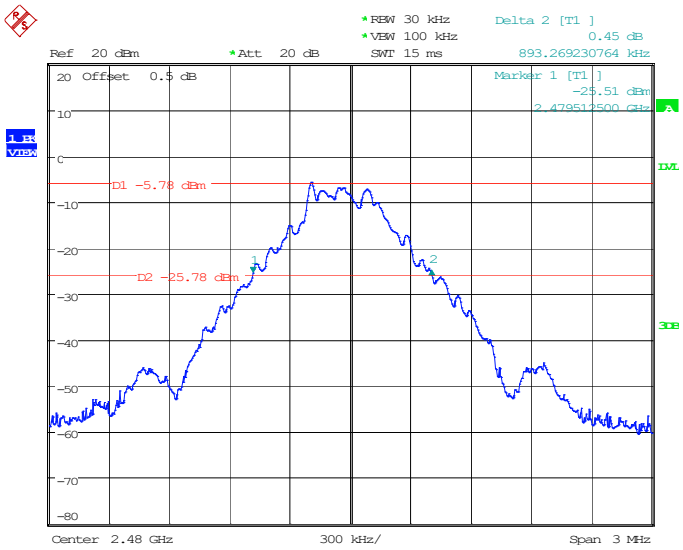
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:50:47

BDR (GFSK): Middle Channel



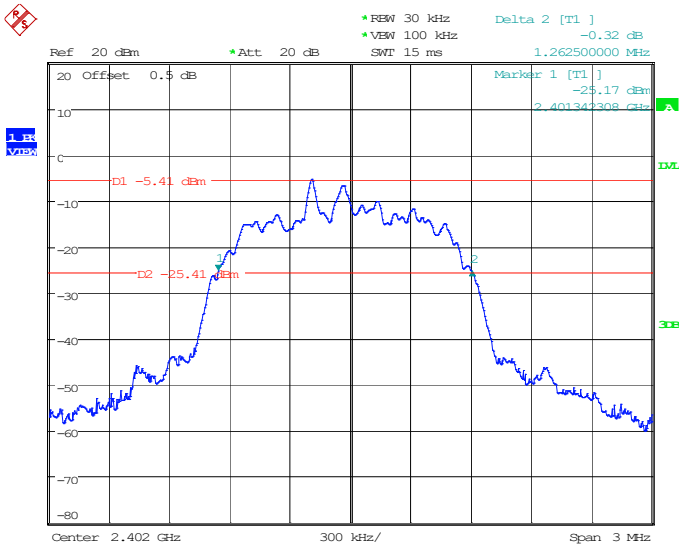
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:04:43

BDR (GFSK): High Channel



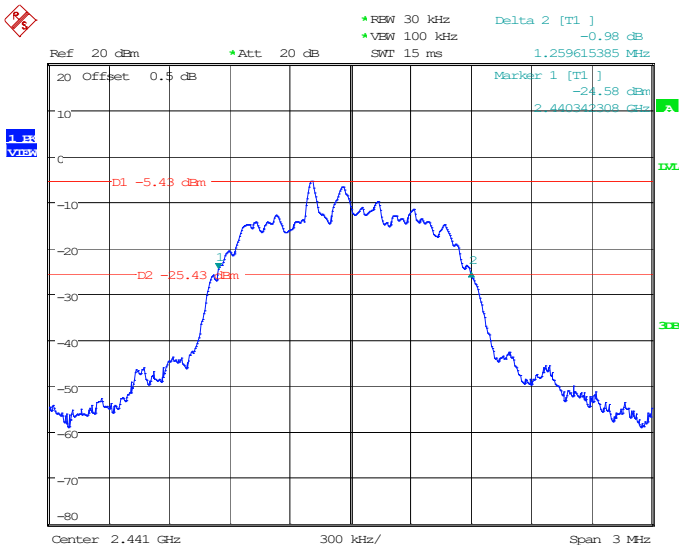
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:13:17

EDR (π/4-DQPSK): Low Channel



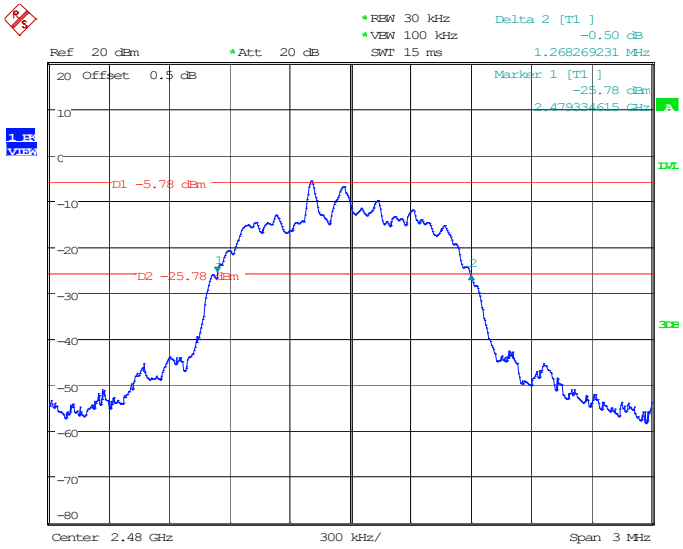
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 10:57:53

EDR(π/4-DQPSK): Middle Channel



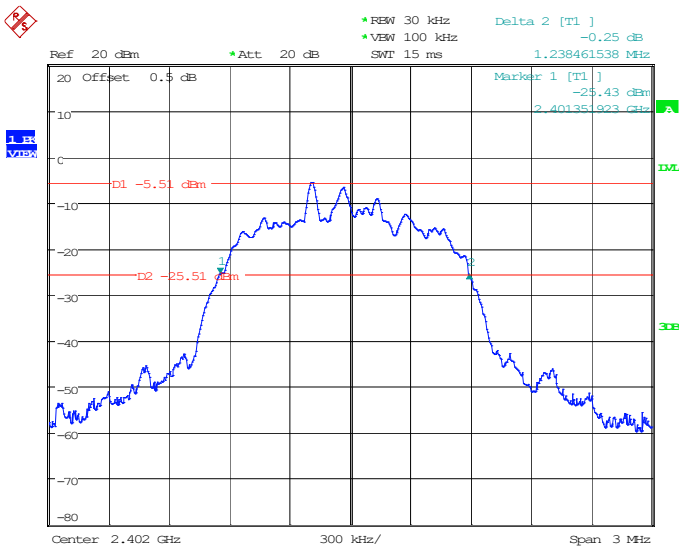
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:07:44

EDR (π/4-DQPSK): High Channel



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:22:30

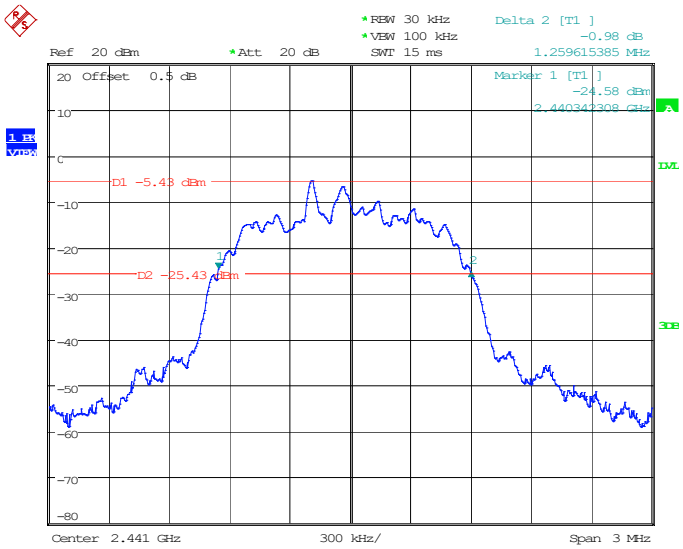
EDR (8DPSK): Low Channel



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 11:00:19

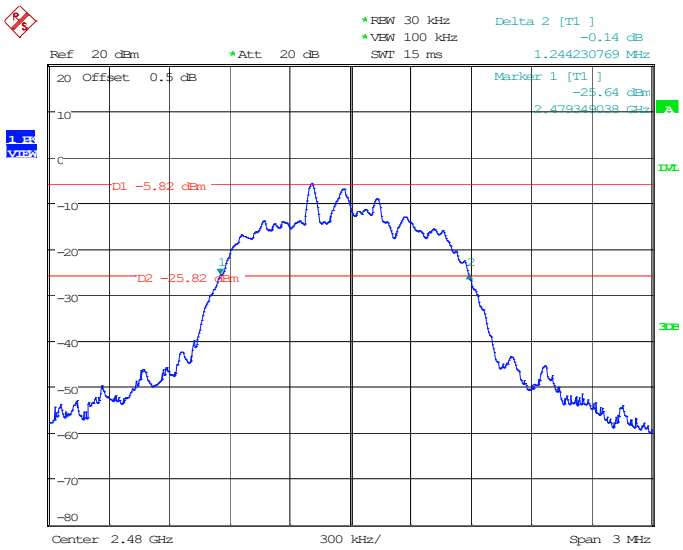
EDR (8DPSK): Middle Channel



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 11:07:44

EDR (8DPSK): High Channel



Project No. :2407T28020E-RF Tester: Stein Peng

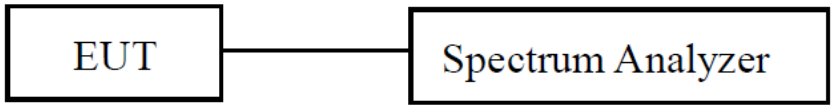
Date: 18.MAY.2024 11:24:21

FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup



Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c. VBW ≥ RBW.
d. Sweep: Auto.
e. Detector function: Peak.
f. Trace: Max hold.
g. Allow the trace to stabilize.

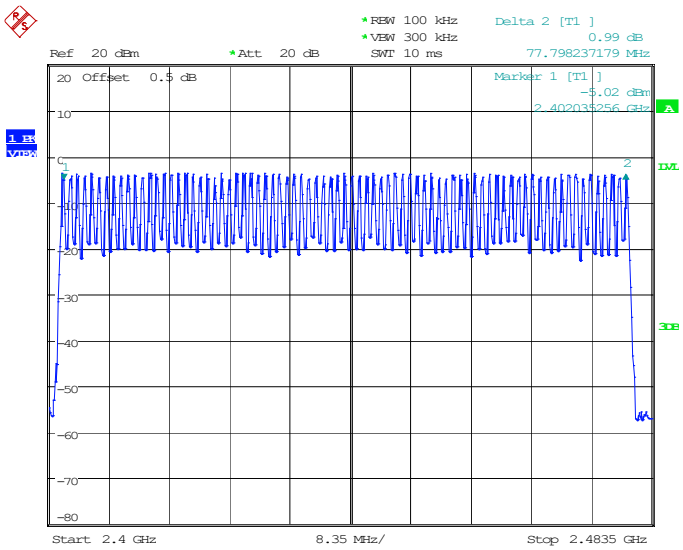
It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9℃ Humi.: 60% Atm:99.8kPa

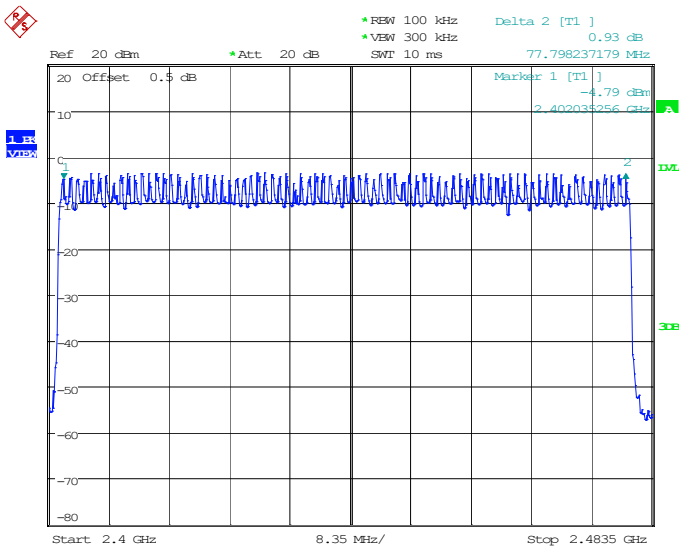
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels



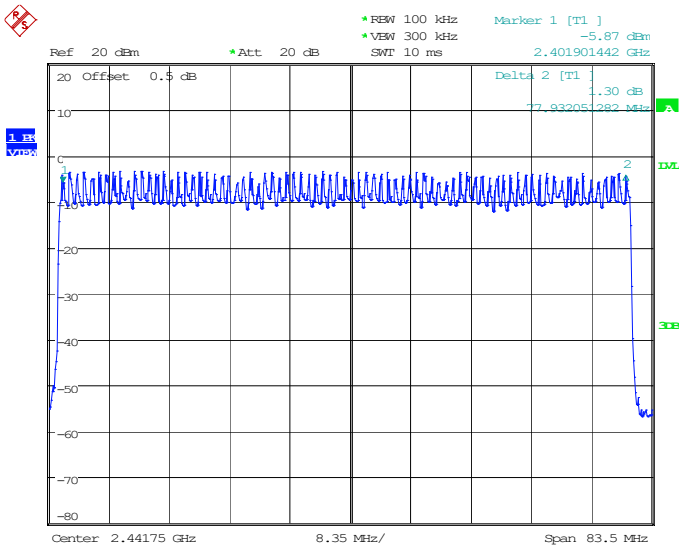
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:42:56

EDR (π/4-DQPSK): Number of Hopping Channels



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 11:53:26

EDR (8DPSK): Number of Hopping Channels



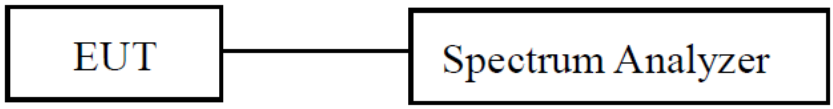
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 12:00:56

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup



Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

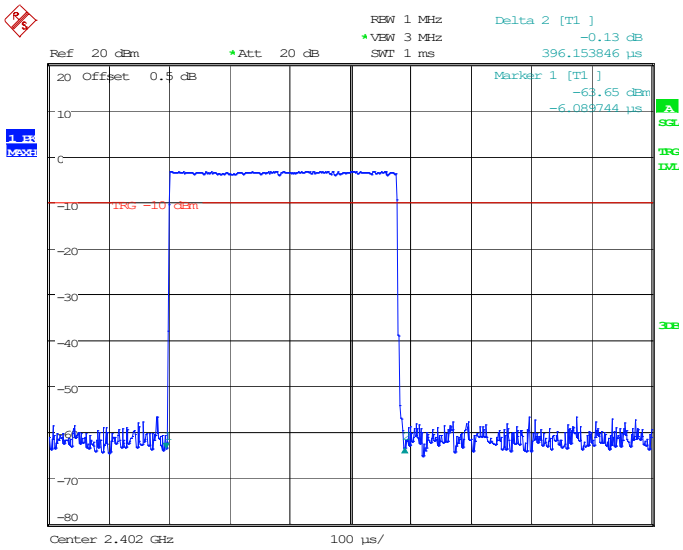
a Span: Zero span, centered on a hopping channel.
b RBW shall be ≤ channel spacing and where possible RBW should be set ≥ 1 / T, where T is the expected dwell time per channel.
c Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d Detector function: Peak.
e Trace: Max hold.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9℃ Humi.: 60% Atm:99.8kPa

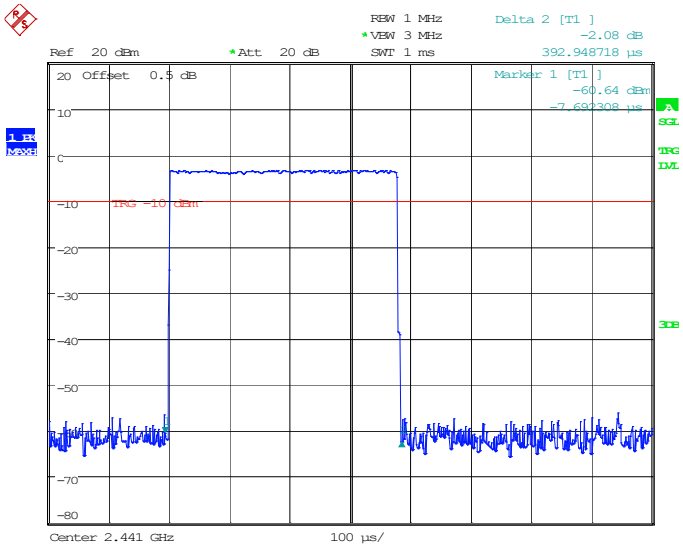
Mode		Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
BDR (GFSK)	DH1	Low	0.396	0.127	0.400	Pass
		Middle	0.393	0.126	0.400	Pass
		High	0.390	0.125	0.400	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH3	Low	1.673	0.268	0.400	Pass
		Middle	1.673	0.268	0.400	Pass
		High	1.668	0.267	0.400	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH5	Low	2.928	0.312	0.400	Pass
		Middle	2.928	0.312	0.400	Pass
		High	2.928	0.312	0.400	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (π/4-DQPSK)	2DH1	Low	0.401	0.128	0.400	Pass
		Middle	0.406	0.130	0.400	Pass
		High	0.401	0.128	0.400	Pass
		Note: 2DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	2DH3	Low	1.668	0.267	0.400	Pass
		Middle	1.673	0.268	0.400	Pass
		High	1.673	0.268	0.400	Pass
		Note: 2DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	2DH5	Low	2.925	0.312	0.400	Pass
		Middle	2.925	0.312	0.400	Pass
		High	2.925	0.312	0.400	Pass
		Note: 2DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	3DH1	Low	0.403	0.129	0.400	Pass
		Middle	0.406	0.130	0.400	Pass
		High	0.405	0.130	0.400	Pass
		Note:3 DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	3DH3	Low	1.677	0.268	0.400	Pass
		Middle	1.682	0.269	0.400	Pass
		High	1.672	0.268	0.400	Pass
		Note: 3DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	3DH5	Low	2.941	0.314	0.400	Pass
		Middle	2.941	0.314	0.400	Pass
		High	2.933	0.313	0.400	Pass
		Note: 3DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

BDR (GFSK): Pulse time, Low Channel, DH1



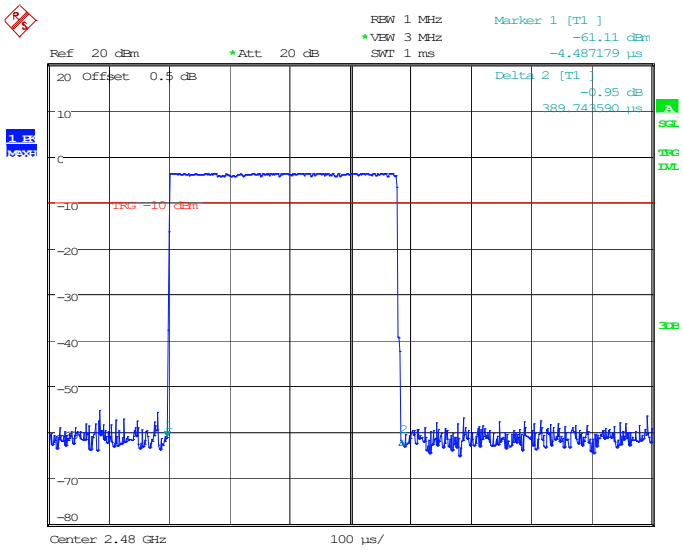
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:07:56

BDR (GFSK): Pulse time, Middle Channel, DH1



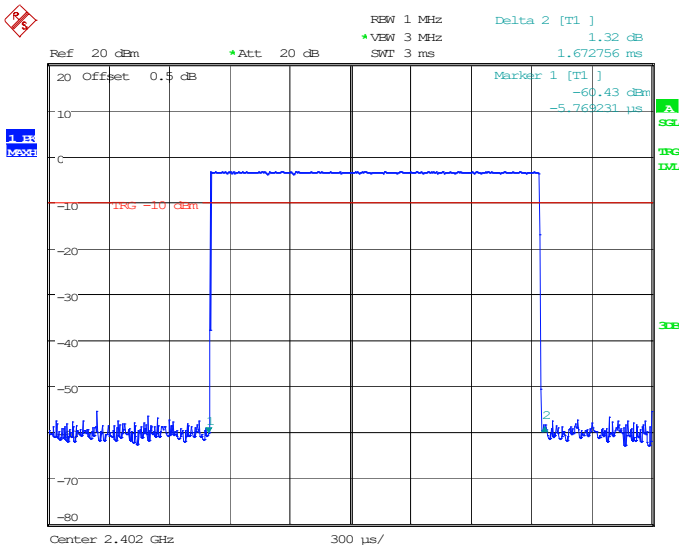
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:21:42

BDR (GFSK): Pulse time, High Channel, DH1



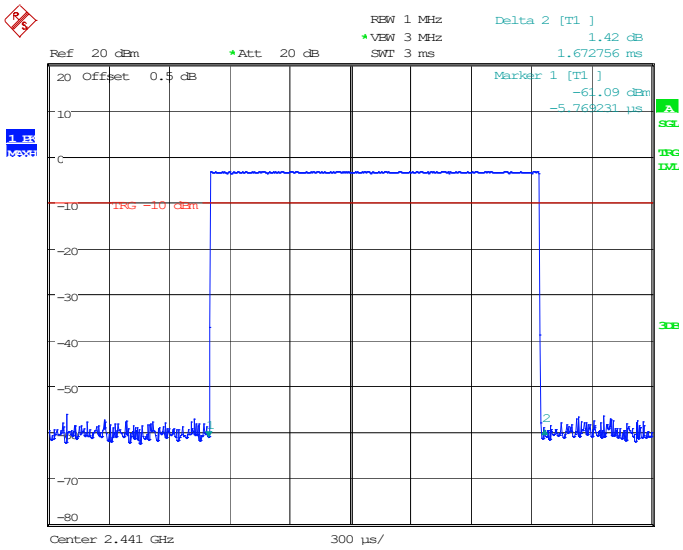
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:22:19

BDR (GFSK): Pulse time, Low Channel, DH3



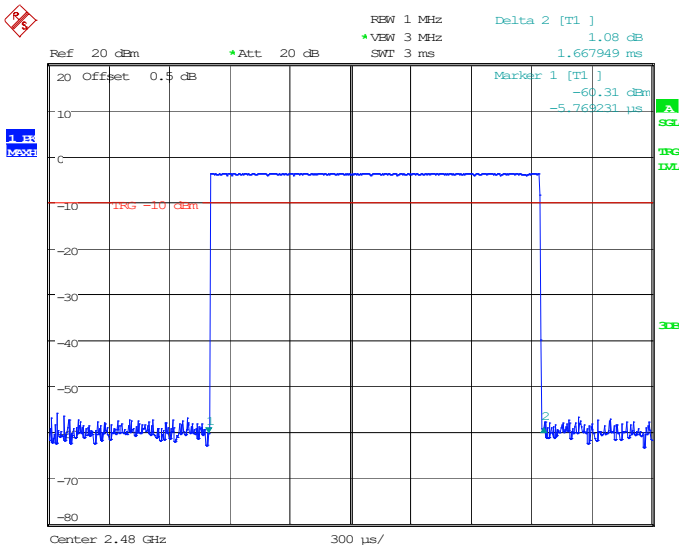
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:27:32

BDR (GFSK): Pulse time, Middle Channel, DH3



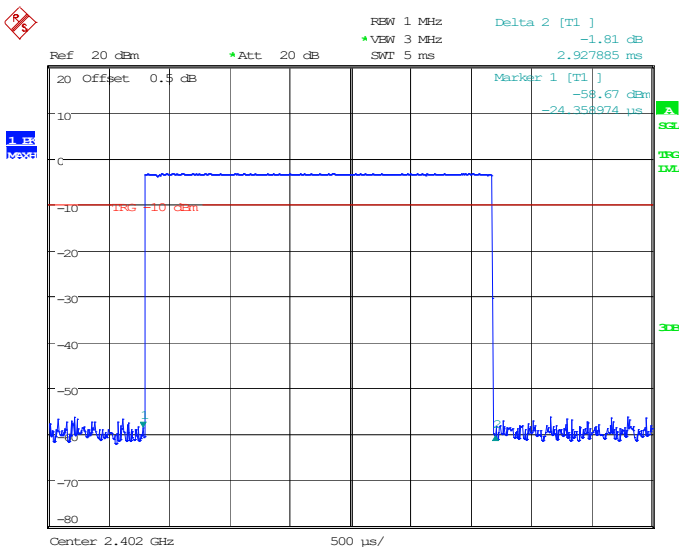
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:27:05

BDR (GFSK): Pulse time, High Channel, DH3



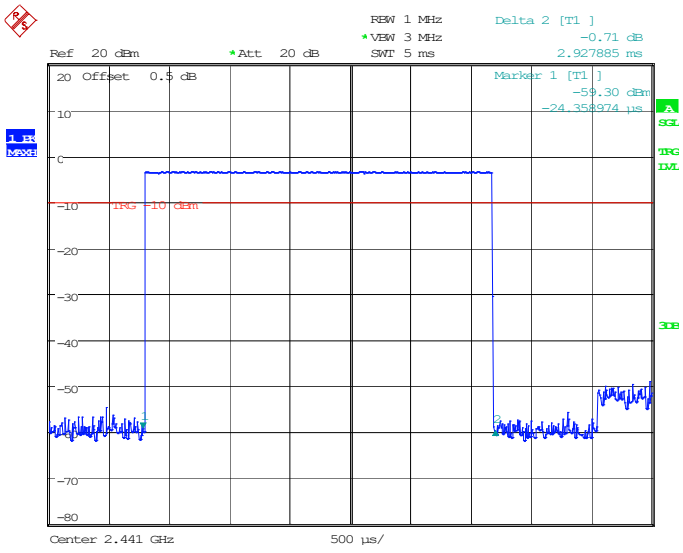
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:26:32

BDR (GFSK): Pulse time, Low Channel, DH5



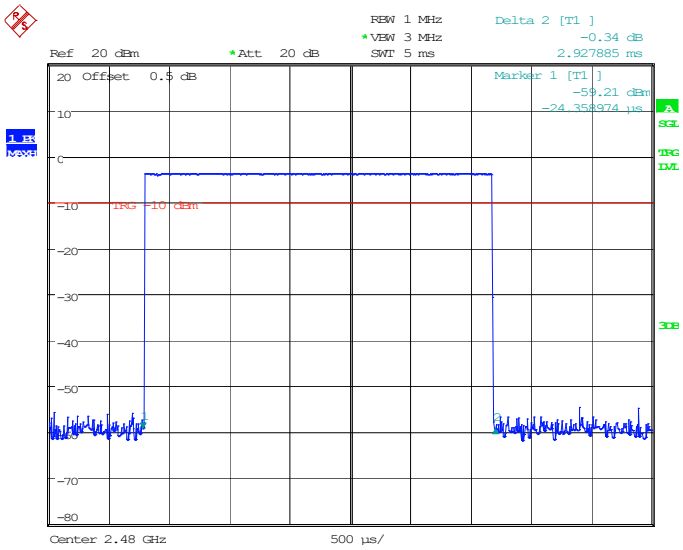
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:35:34

BDR (GFSK): Pulse time, Middle Channel, DH5



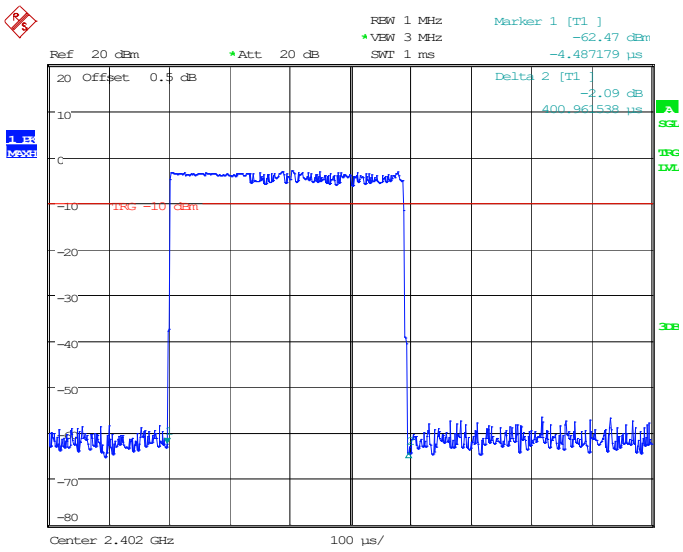
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:35:58

BDR (GFSK): Pulse time, High Channel, DH5



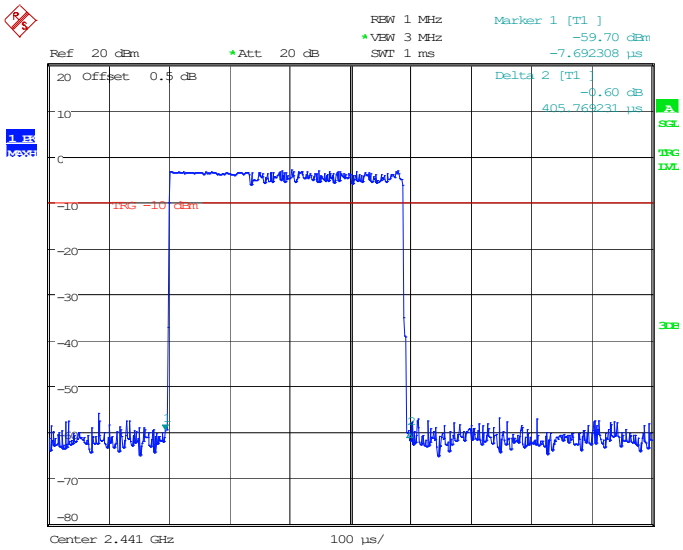
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:36:48

EDR (π/4-DQPSK): Pulse time, Low Channel, 2DH1



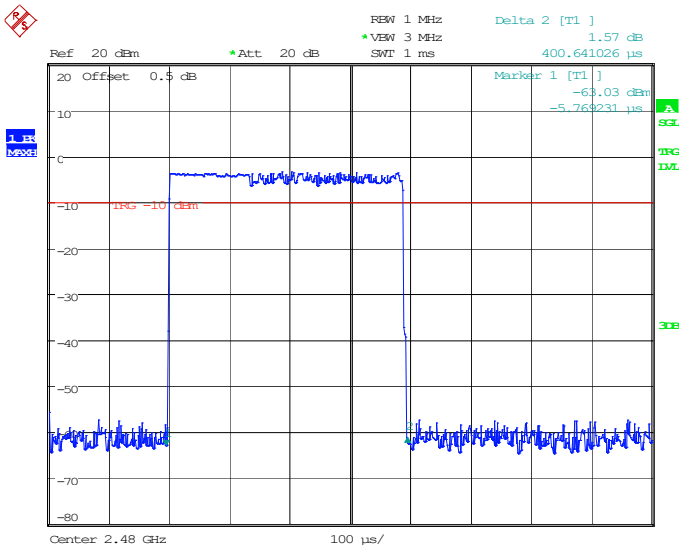
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:17:16

EDR (π/4-DQPSK):Pulse time, Middle Channel, 2DH1



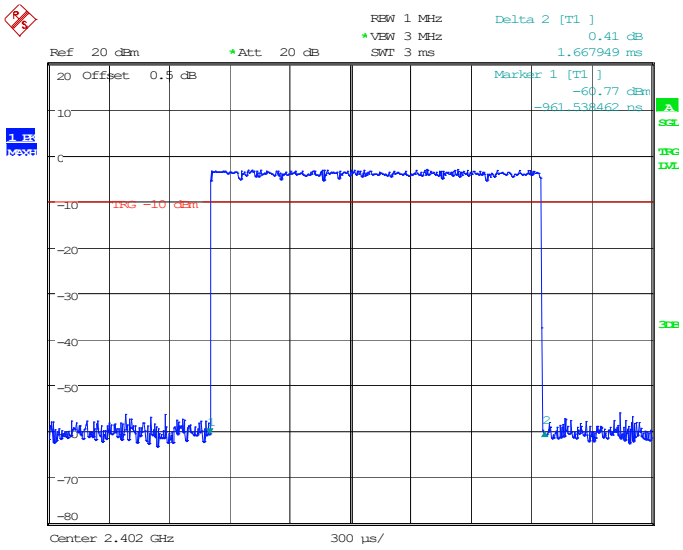
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:20:21

EDR (π/4-DQPSK):Pulse time, High Channel, 2DH1



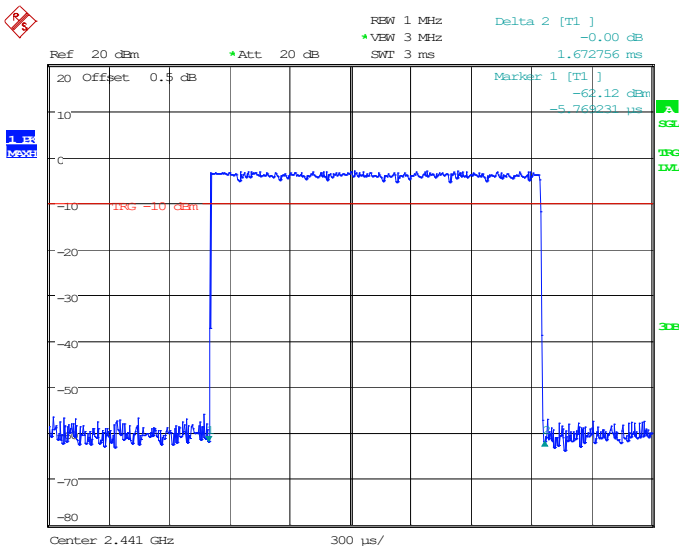
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:23:02

EDR (π/4-DQPSK):Pulse time, Low Channel, 2DH3



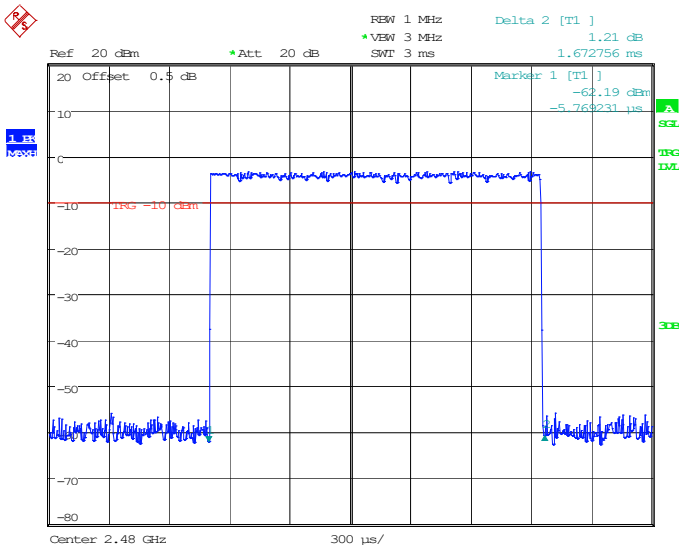
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:28:14

EDR (π/4-DQPSK):Pulse time, Middle Channel, 2DH3



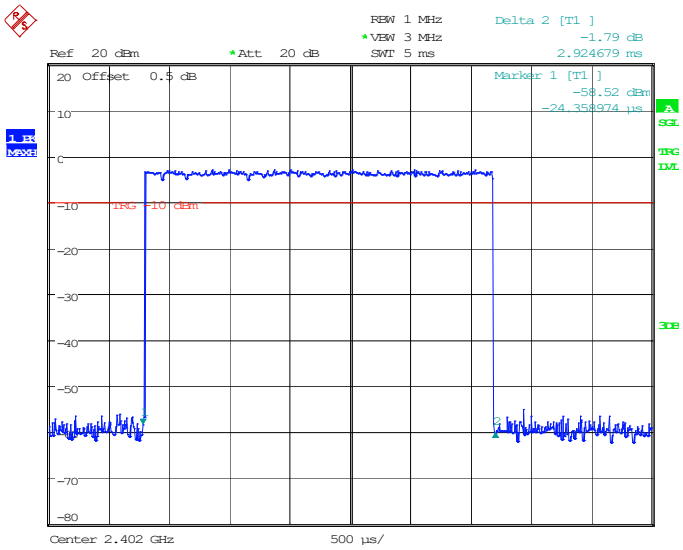
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:28:48

EDR (π/4-DQPSK):Pulse time, High Channel, 2DH3



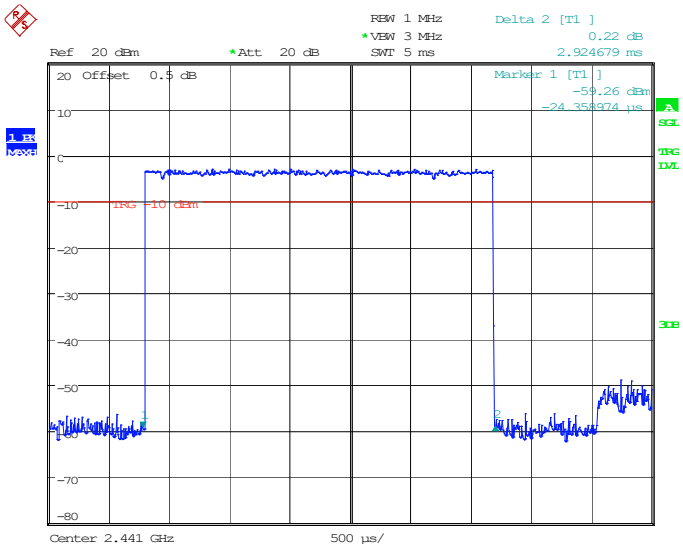
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:29:15

EDR (π/4-DQPSK):Pulse time, Low Channel, 2DH5



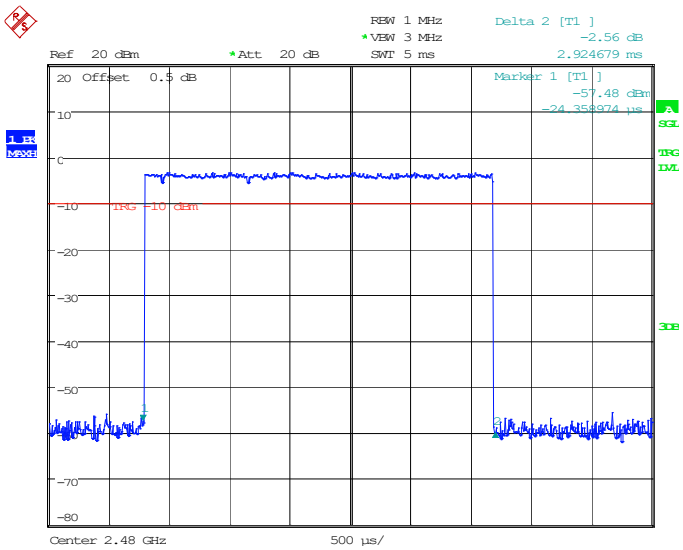
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:38:10

EDR (π/4-DQPSK):Pulse time, Middle Channel, 2DH5



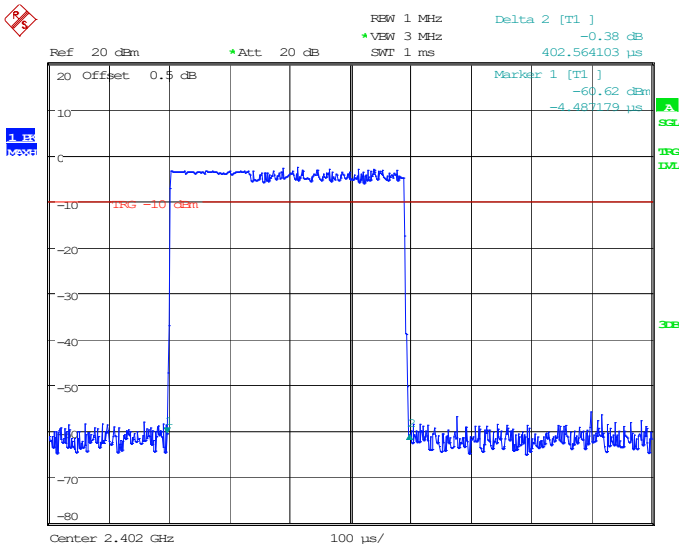
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:37:47

EDR (π/4-DQPSK):Pulse time, High Channel, 2DH5



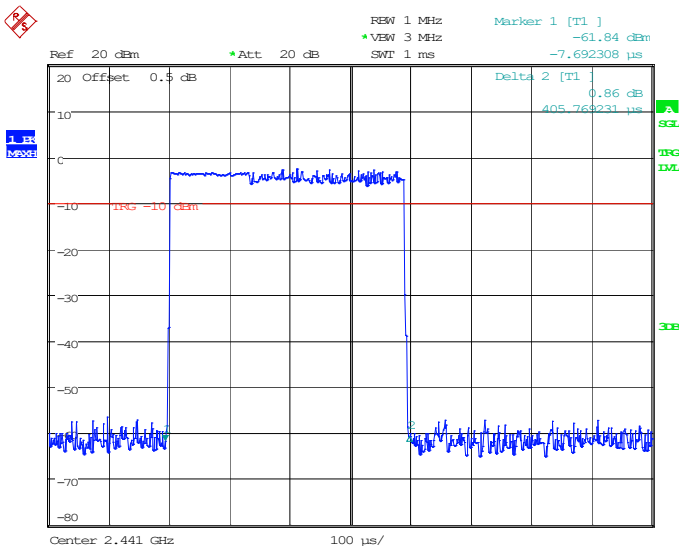
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:37:27

EDR (8DPSK): Pulse time, Low Channel, 3DH1



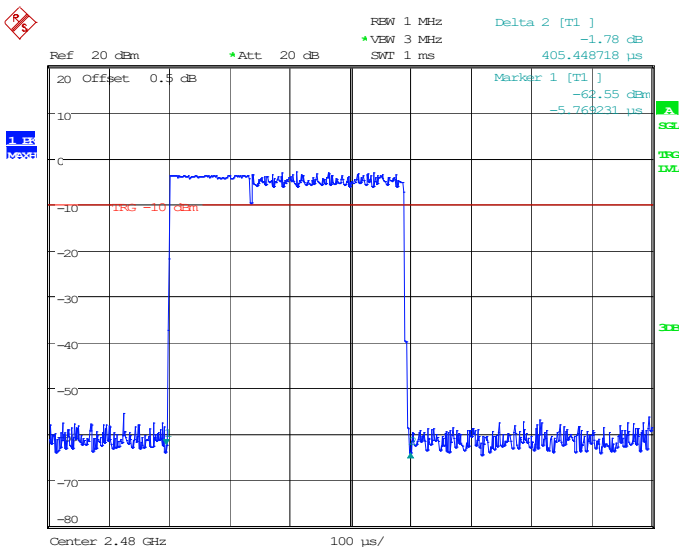
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:18:06

EDR (8DPSK): Pulse time, Middle Channel, 3DH1



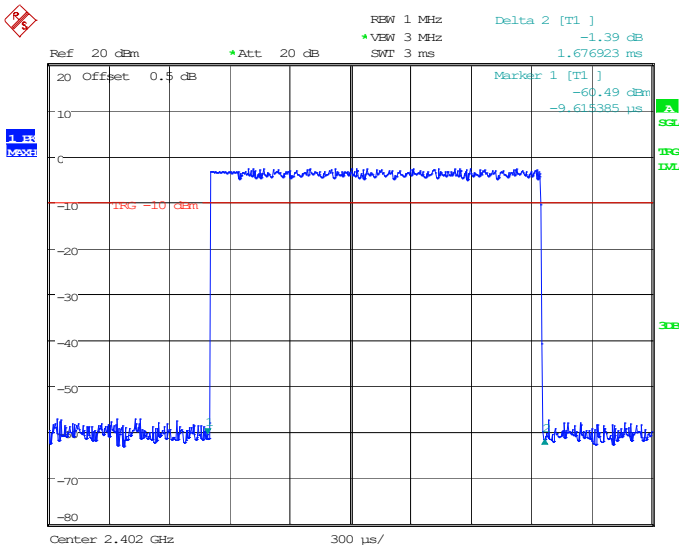
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:19:41

EDR (8DPSK): Pulse time, High Channel, 3DH1



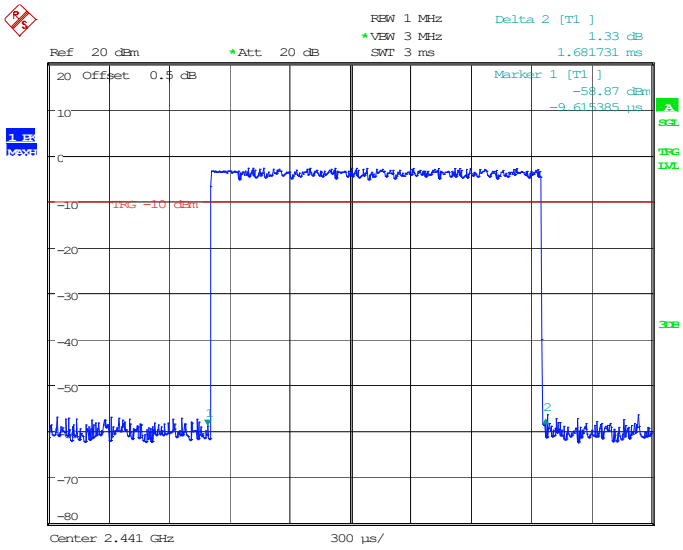
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:23:52

EDR (8DPSK): Pulse time, Low Channel, 3DH3



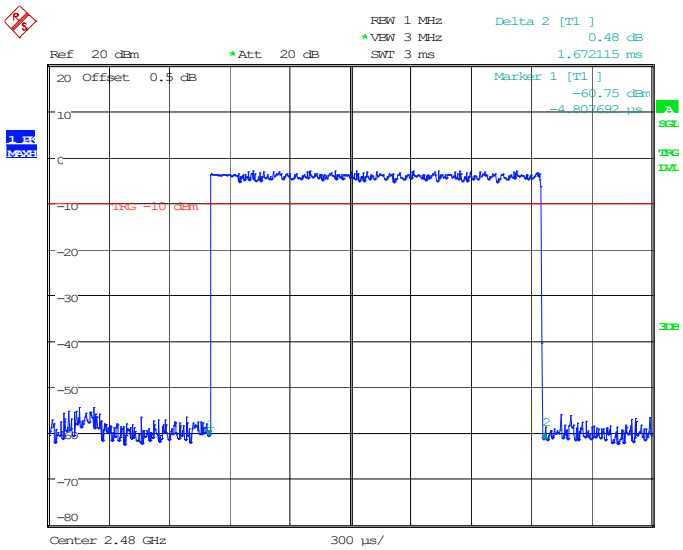
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:54:55

EDR (8DPSK): Pulse time, Middle Channel, 3DH3



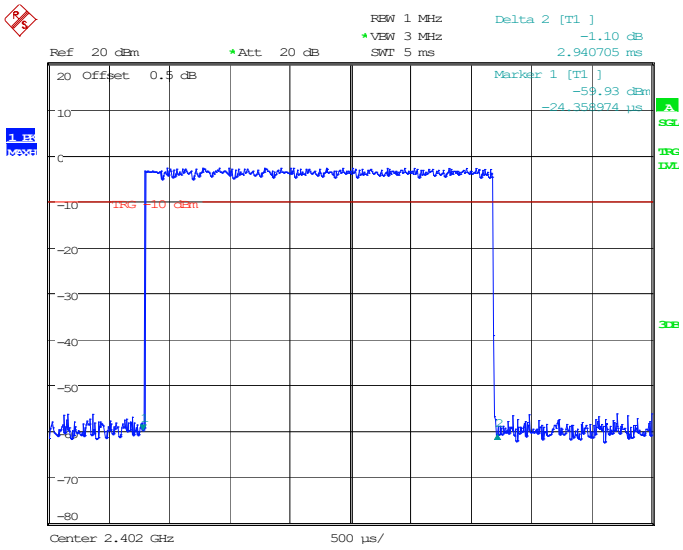
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:56:13

EDR (8DPSK): Pulse time, High Channel, 3DH3



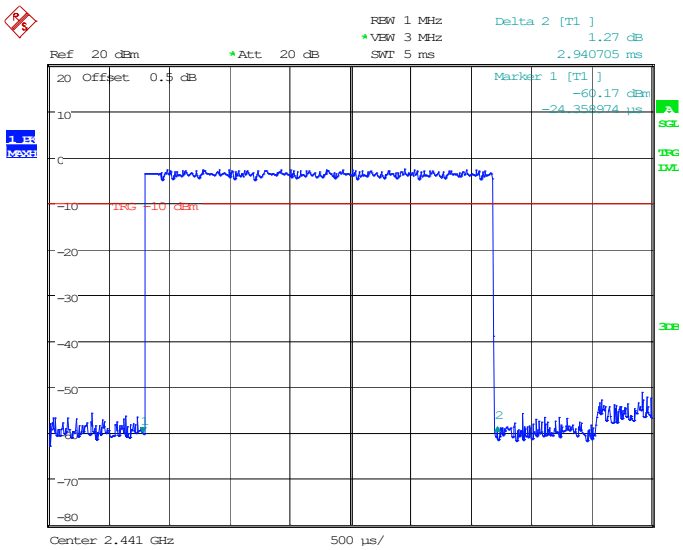
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 15:56:54

EDR (8DPSK): Pulse time, Low Channel, 3DH5



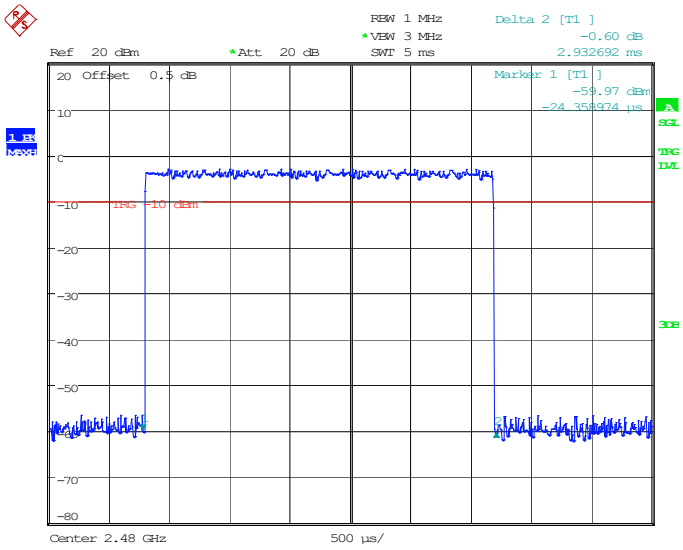
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:38:36

EDR (8DPSK): Pulse time, Middle Channel, 3DH5



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:38:55

EDR (8DPSK): Pulse time, High Channel, 3DH5



Project No. :2407T28020E-RF Tester: Stein Peng

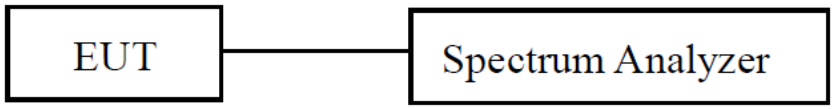
Date: 18.MAY.2024 13:39:24

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

EUT Setup



Test Procedure

a. Use the following spectrum analyzer settings:
   1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
   2) RBW > 20 dB bandwidth of the emission being measured.
   3) VBW ≥ RBW.
   4) Sweep: Auto.
   5) Detector function: Peak.
   6) Trace: Max hold.

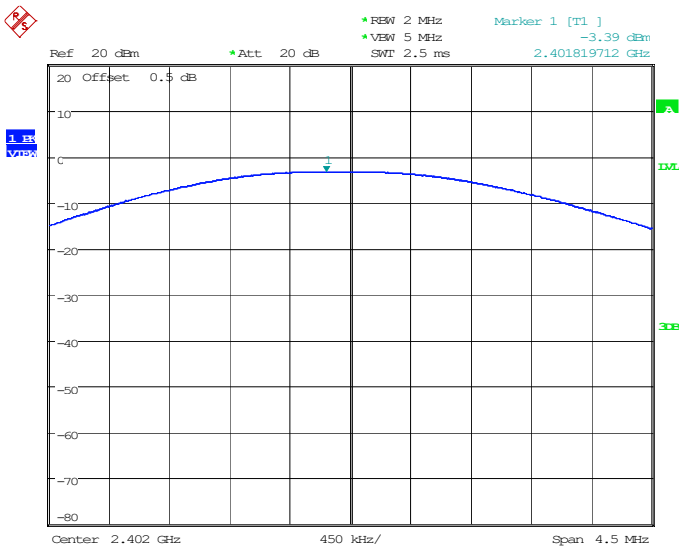
b. Allow trace to stabilize.
c. Use the marker-to-peak function to set the marker to the peak of the emission.
d. The indicated level is the peak output power, after any corrections for external attenuators and cables.
e. A plot of the test results and setup description shall be included in the test report.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9℃ Humi.: 60% Atm:99.8kPa

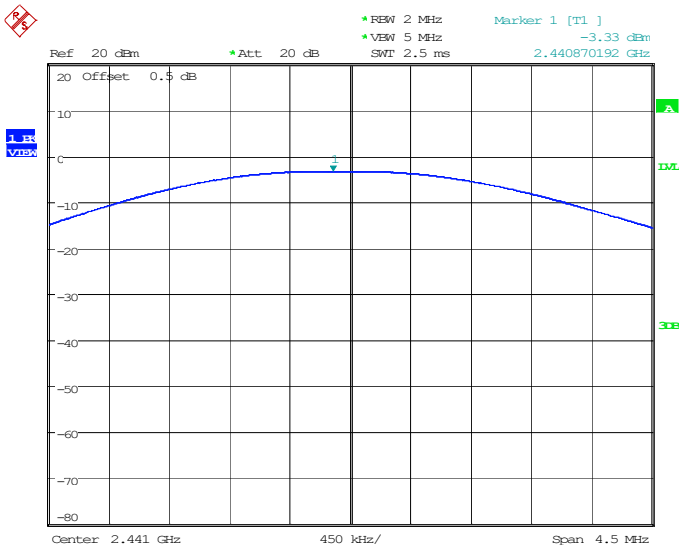
Mode	Frequency (MHz)	Peak Conducted Output Power (dBm)	Limit (dBm)
BDR (GFSK)	2402	-3.39	21
	2441	-3.33	21
	2480	-3.69	21
EDR (π/4-DQPSK)	2402	-2.56	21
	2441	-2.52	21
	2480	-2.85	21
EDR (8DPSK)	2402	-1.96	21
	2441	-1.98	21
	2480	-2.33	21

BDR (GFSK): 2402MHz



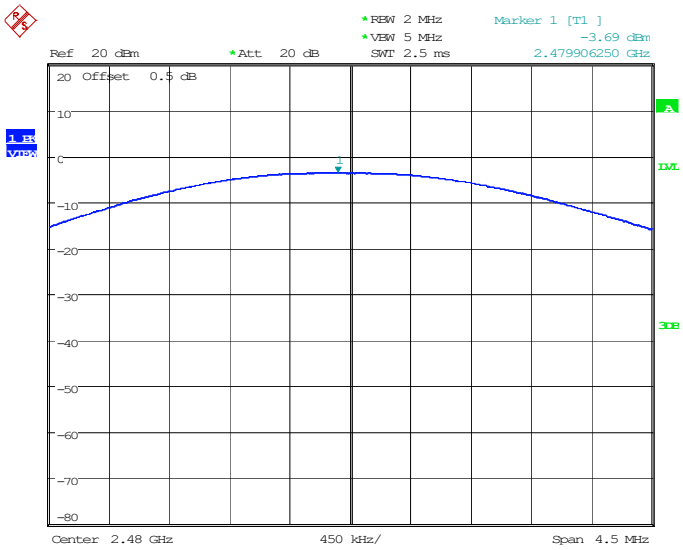
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:48:09

BDR (GFSK): 2441MHz



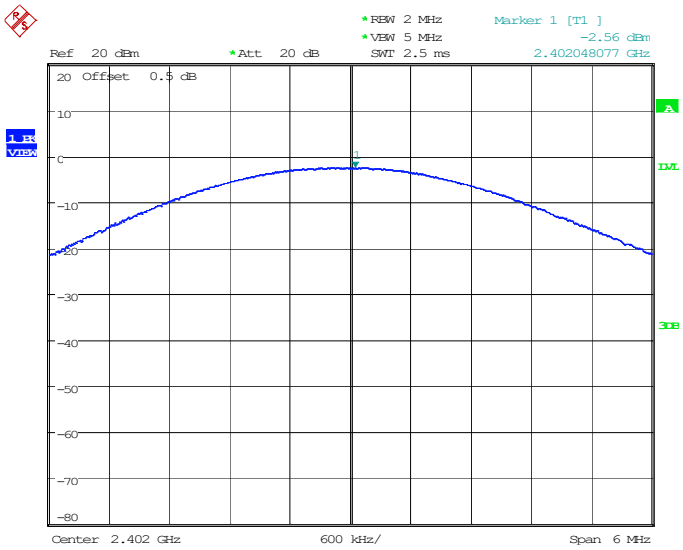
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:50:02

BDR (GFSK): 2480MHz



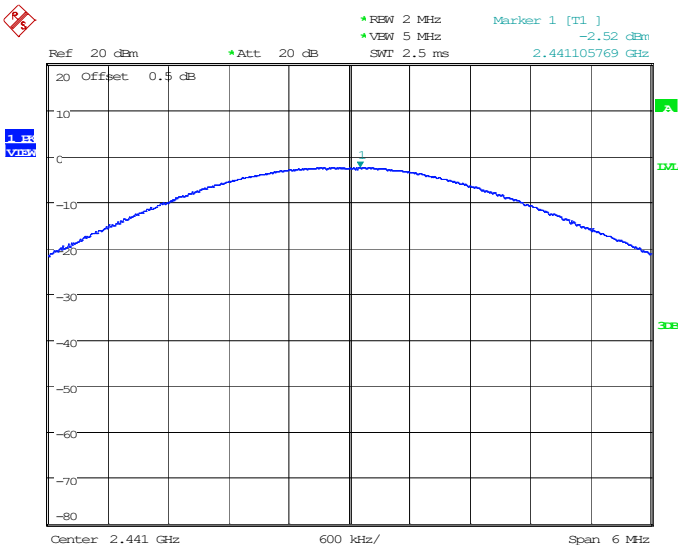
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:50:44

EDR(π/4-DQPSK): 2402MHz



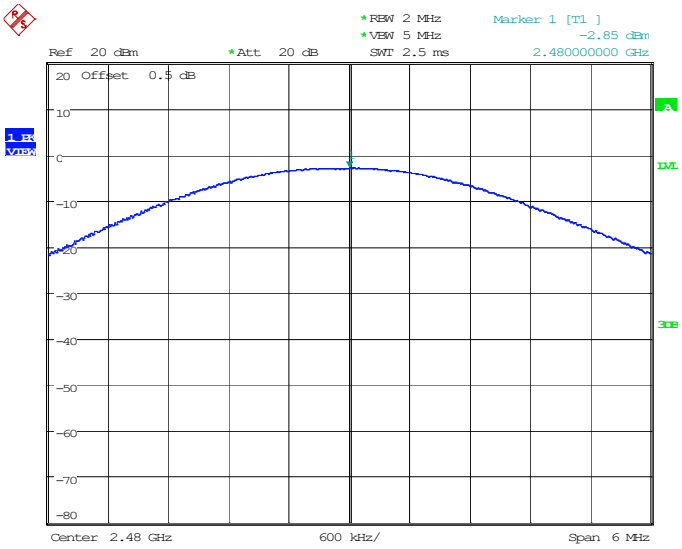
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:52:00

EDR(π/4-DQPSK): 2441MHz



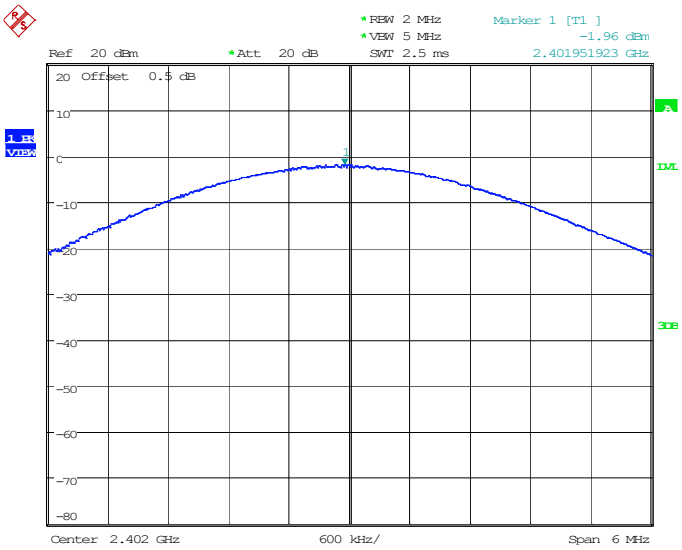
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:53:26

EDR(π/4-DQPSK): 2480MHz



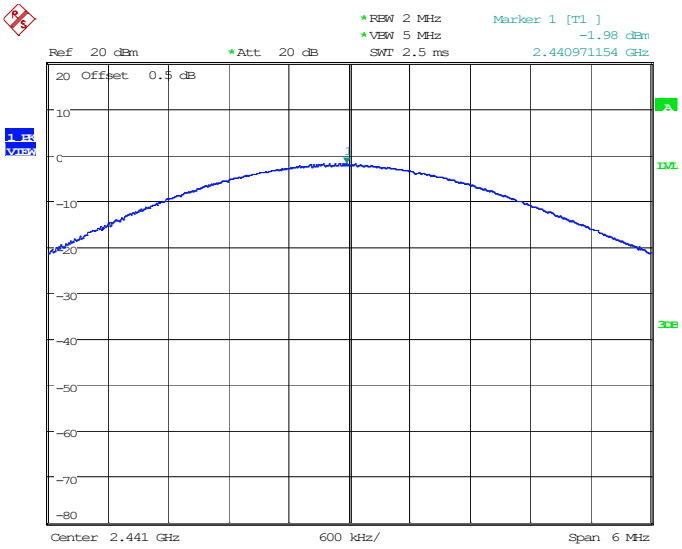
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:54:03

EDR(8DPSK): 2402MHz



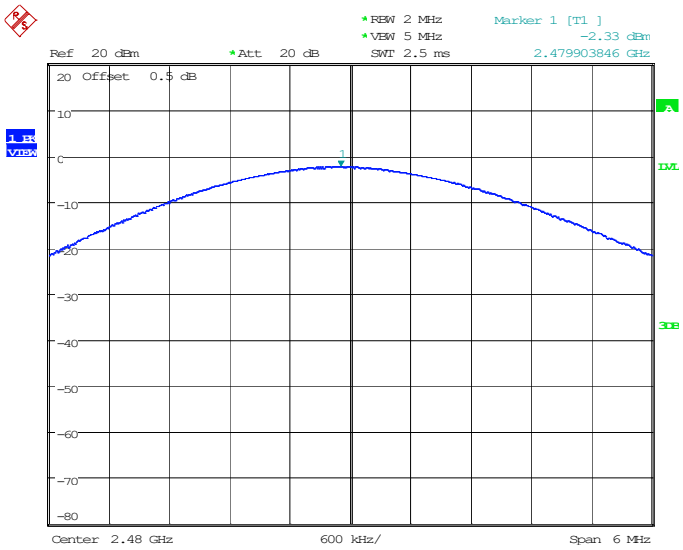
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:55:20

EDR(8DPSK): 2441MHz



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:55:59

EDR(8DPSK): 2480MHz



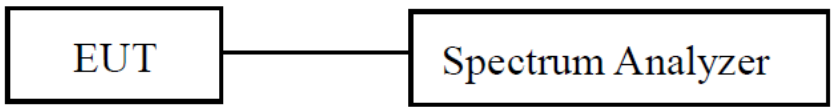
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 13:56:57

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates Compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EUT Setup



Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

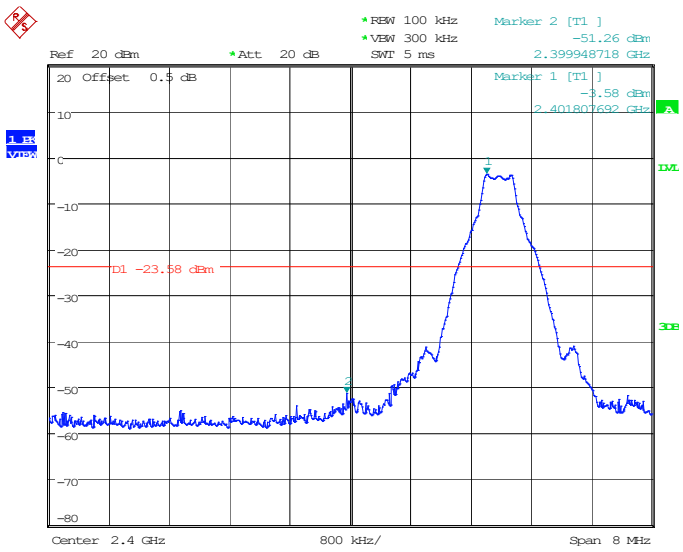
Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-18	Environment:	Temp.: 23.9°C Humi.: 60% Atm:99.8kPa

Please refer to the below plots:

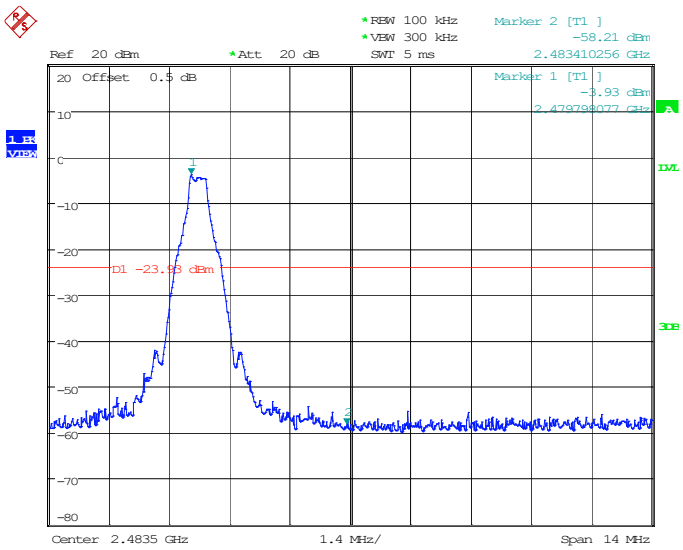
Band Edge

BDR (GFSK): Left Side



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 14:15:19

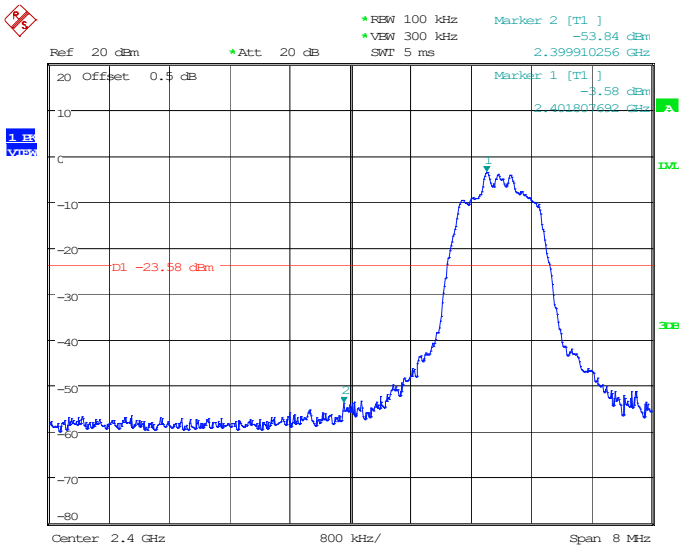
BDR (GFSK): Right Side



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:24:28

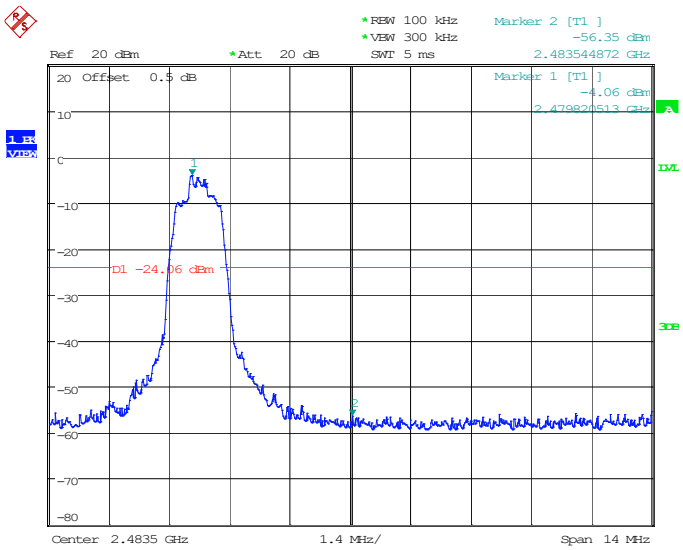
EDR (π/4-DQPSK): Left Side



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:17:47

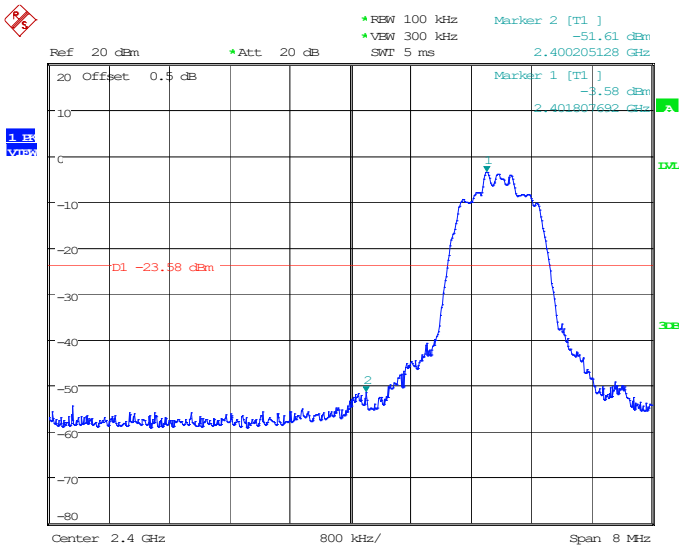
EDR (π/4-DQPSK): Right Side



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:22:54

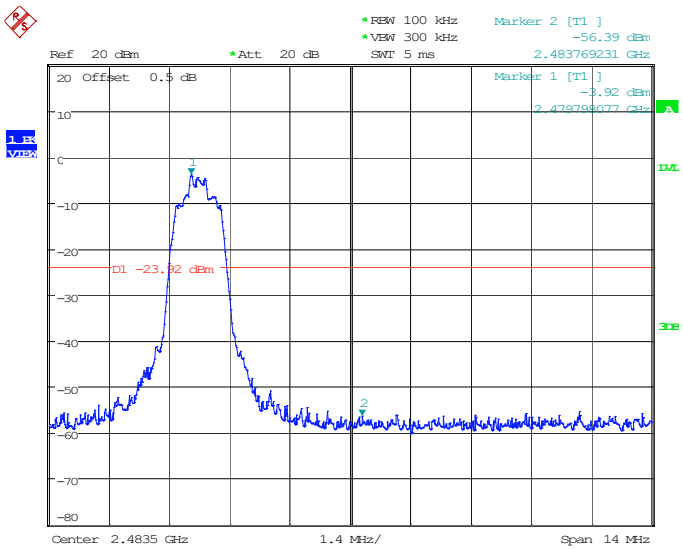
EDR (8DPSK): Left Side



Project No. :2407T28020E-RF Tester: Stein Peng

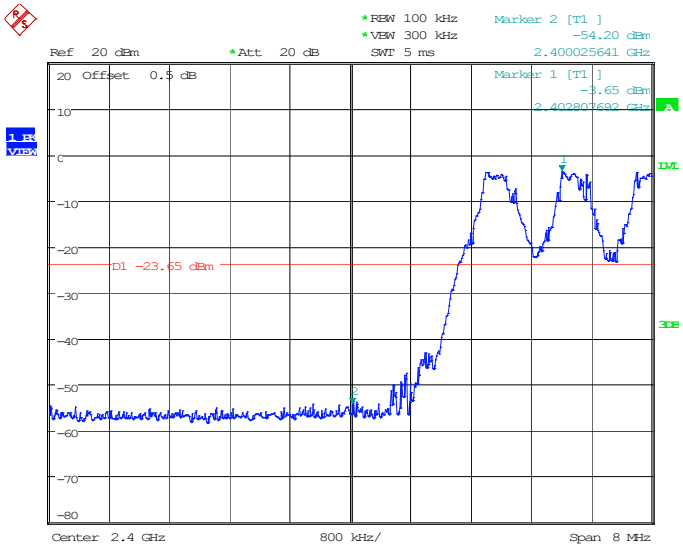
Date: 18.MAY.2024 14:19:03

EDR (8DPSK): Right Side



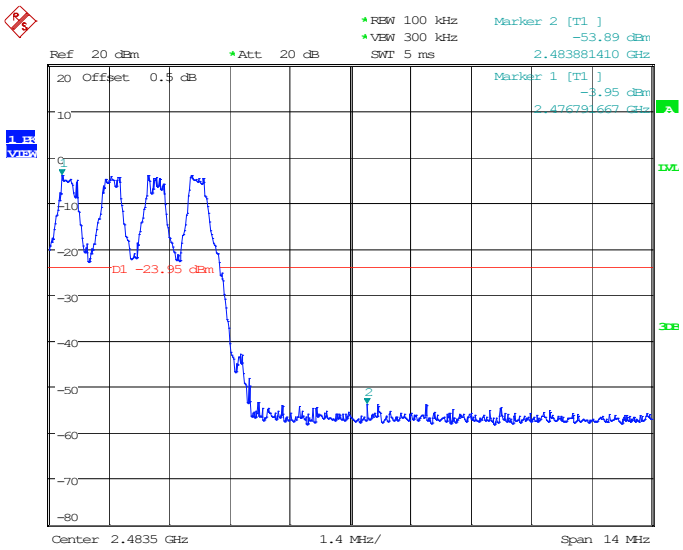
Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 14:25:44

BDR (GFSK): Left Side- Hopping



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 14:50:35

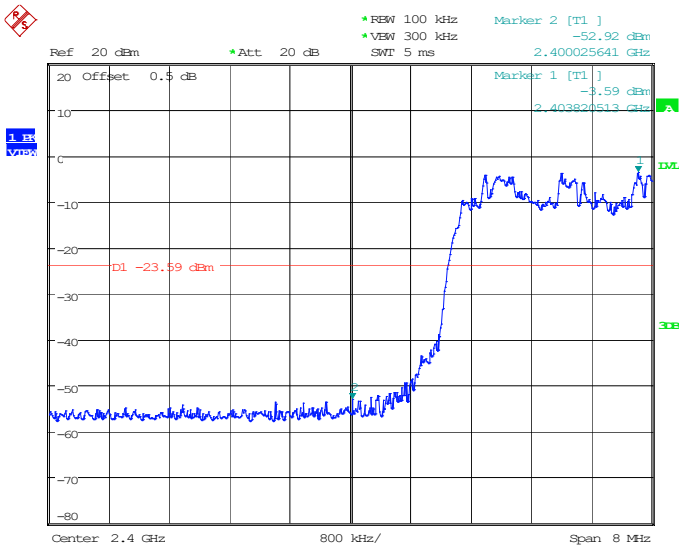
BDR (GFSK): Right Side- Hopping



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:39:06

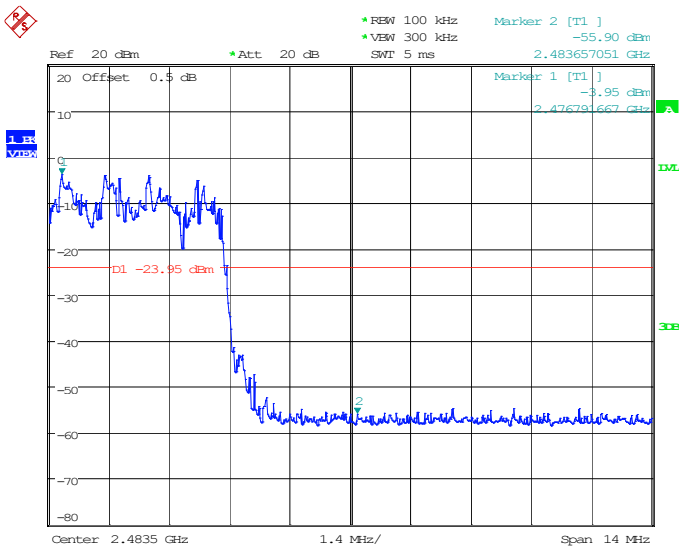
EDR (π/4-DQPSK): Left Side - Hopping



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:56:22

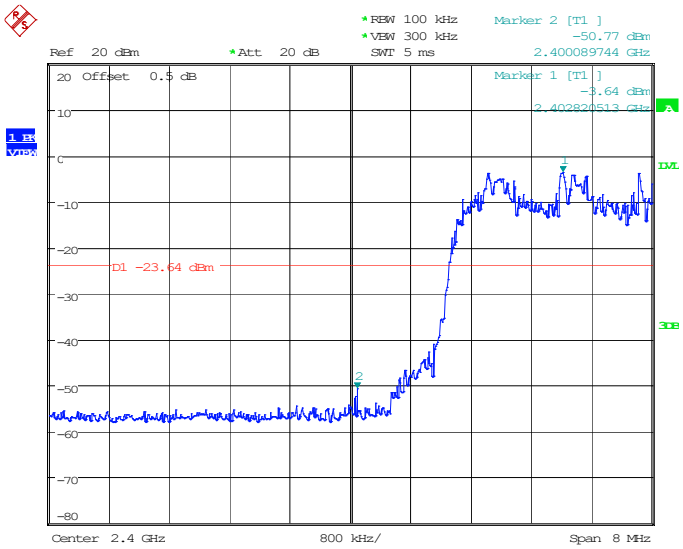
EDR (π/4-DQPSK): Right Side - Hopping



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:34:14

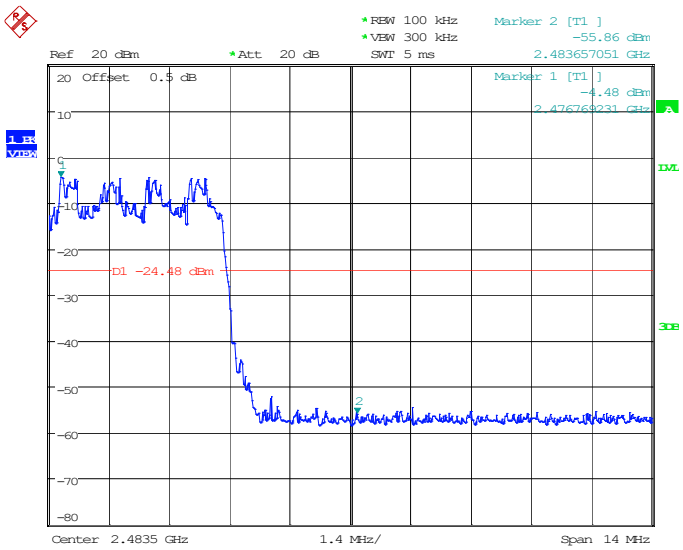
EDR (8DPSK): Left Side - Hopping



Project No. :2407T28020E-RF Tester: Stein Peng

Date: 18.MAY.2024 14:59:50

EDR (8DPSK): Right Side - Hopping



Project No. :2407T28020E-RF Tester: Stein Peng
Date: 18.MAY.2024 14:29:50

EUT PHOTOGRAPHS

Please refer to the attachment 2407T28020E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2407T28020E-RF-INP EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2407T28020E-RF-TSP_TEST SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

******* END OF REPORT *******